FINAL
BARRIER WALL EXTRACTION SYSTEM
OFF-SITE AREA UPGRADES
CONSTRUCTION COMPLETION REPORT

AMERICAN CHEMICAL SERVICE INC.
NPL SITE
GRIFFITH, INDIANA

MWH File No. 2090601

Prepared For:

American Chemical Service NPL Site RD/RA Executive Committee
Griffith, Indiana

Prepared By:

MWH
27755 Diehl Road, Suite 300
Warrenville, Illinois 60555

March 2003

MWH
MONTGOMERY WATSON HARZA

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Prepared by: ______________________ 3/3/03
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ACRONYMS AND ABBREVIATIONS

ACS	American Chemical Services, Inc.
amsl	Above mean seal level
BWES	Barrier Wall Extraction System
CCR	Construction Completion Report
CDS	Contract Dewatering Service, Inc.
GWTP	Groundwater Treatment Plant
HASP	Health and Safety Plan
ISVE	In-situ Vapor Extraction system
KES	Koester Environmental Services, Inc.
K-P Area	Kapica-Pazmey Area
NIPSCO	Northern Indiana Public Service Company
NPL	National Priorities List
OFCA	Off-Site Containment Area
ONCA	On-Site Containment Area
PID	Photo-ionization detector
PLC	Programmable Logic Controller
PPE	Personal Protection Equipment
psi	Pounds per square inch
PVC	Polyvinyl chloride
SBPA	Still Bottoms Pond Area
VOC	Volatile organic compound

1.0 INTRODUCTION

This Construction Completion Report (CCR) summarizes the installation of additional extraction wells and trenches, conveyance and utility piping, and instrumentation and controls associated with the Barrier Wall Extraction System (BWES) in the Off-Site Area of the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site in Griffith, Indiana from December 2000 to October 2001.

1.1 SITE BACKGROUND

The ACS NPL Site is an operating chemical processing facility. Past operations have impacted five land disposal areas: the On-Site Containment Area (ONCA), the Still Bottom Pond Area (SBPA), the Treatment Lagoon, the Off-Site Containment Area (OFCA), and the Kapica/Pazmey Area (K-P Area). The OFCA and K-P Area will be referred to collectively in this report as the Off-Site Area. A portion of the wetlands located to the west of the ACS Site had also been impacted by past facility operations. A site map is shown on Figure 1.

In 1997, MWH installed a continuous perimeter barrier wall around the ONCA, the ACS operating facility, the OFCA, and the K-P Area. The barrier wall encloses the contamination source areas at the Site. A groundwater extraction system inside the barrier wall was installed to maintain hydraulic capture within the barrier wall, and is referred to as the BWES. The system is comprised of eight 100-foot long extraction trenches. Extraction wells were installed at the end of each trench to collect the groundwater. These extraction wells are numbered EW-10, EW-11, EW-12, EW-13, EW-15, EW-16, EW-17, and EW-18. Water collected by the BWES is treated at the on site Groundwater Treatment Plant (GWTP).

Concurrent with the activities documented in this report, MWH installed a Separation Barrier Wall from January to February 2001. The Separation Barrier Wall provides vertical, hydraulic separation of groundwater minimizing migration of contaminated groundwater from the On-Site Area to the Off-Site Area. The separation wall is keyed into a clay layer approximately 20 feet below ground surface. Figure 2 shows the locations of the Separation Barrier Wall and the original Barrier Wall installed along the perimeter of the site. Installation of the Separation Barrier Wall is detailed in the *Separation Barrier Wall Installation Construction Completion Report* (MWH, March 2002).

Pursuant to the *Final Remedial Design Report* (MWH, August 1999), In-situ Soil Vapor Extraction (ISVE) systems are to be installed in the On-Site Area and the Off-Site Area. Because the barrier wall already contains the source areas at the Site, the primary objective of ISVE at the ACS Site is removal of volatile organic compounds (VOCs) from the source areas. At the time of the activities documented in this report, construction of the On-Site and Off-Site ISVE systems had not been completed. Construction completion and documentation as-builts of the ISVE systems will be submitted in a separate report.

Further information regarding the history of the ACS NPL Site is available in the *Final Remedial Design Report*.

1.2 BARRIER WALL EXTRACTION SYSTEM OBJECTIVES

The *Final Remedial Design Report* established design objectives for the groundwater extraction system to meet dewatering requirements for optimal operation of the Off-Site Area ISVE system. In the Off-Site Area, the objective of the BWES is to lower the water table from the preexisting levels of approximately 634 feet above mean sea level (amsl) to 626 feet amsl. This will result in a drawdown of approximately eight feet in the Off-Site Area.

Calculations based on performance of the existing system indicated the capacity of the extraction system in the Off-Site area would need to be increased by 10 gallons per minute (gpm) for a total extraction capacity of 20 gpm in the area to achieve the desired drawdown. This increase could be accomplished with the addition of 500 lineal feet of extraction trench.

The *Final Remedial Design Report* specified that the additional 500-ft of trenching be obtained by installing two trenches. One trench (designated as Extraction Trench 20) would be 350 feet long and located between the separation barrier wall and OFCA ISVE well field, and the other, a 150 foot long trench (designated as Extraction Trench 19) would be located just south of the existing Extraction Trench 15. These locations were selected because boring logs indicated that these areas had the least potential to encounter buried refuse during construction.

1.3 SCOPE OF WORK

This construction completion report documents the following tasks:

- **Installation of New Groundwater Extraction Trenches and Wells.** The two new extraction trenches, Extraction Trench 19 and 20, were constructed in the Off-Site Area to increase the BWES capacity as detailed above. Each extraction trench also contains one or more extraction wells. A replacement well was also installed along Extraction Trench 13.

- **Installation of Conveyance and Utility Piping.** The expansion of the Off-Site BWES and future installations of the ISVE systems required the installation of conveyance and utility piping from the GWTP to the new extraction wells and the locations of the ISVE blower sheds.

- **Installation of Pumps, Controls, and Instrumentation.** The expansion of the **BWES** required the installation of groundwater extraction pumps and controls and instrumentation associated with the system.

The Gantt chart in Appendix A summarizes dates and durations of each of these components.

2.0 SUMMARY OF CONSTRUCTION ACTIVITIES

2.1 EXTRACTION TRENCH AND WELL INSTALLATION

Extraction Trenches 19 and 20 were constructed in the Off-Site Area to meet the objectives detailed in Section 1.2. Two extraction wells were installed along Extraction Trench 19. Four extraction wells were installed along Extraction Trench 20.

MWH selected Contract Dewatering Services, Inc. (CDS) of Saranac, Michigan to construct the new groundwater extraction trenches and wells. CDS mobilized to the site three times to complete the work, first on December 20, 2000, and then in July 2001 and October/November 2001.

A full report of the construction activities, installation procedures, and quality control procedures is included in the Construction Documentation Report written by Hanson Engineering, a subcontractor for CDS provided in Appendix B. Appendix C provides Field Records from Hanson Engineering. These records provide details of the construction of the trenches and wells. Daily field reports prepared by CDS are included as Appendix D. A Photograph Log of the construction of the extraction trenches and wells is included in Appendix E.

2.1.1 Extraction Trench Construction

Construction of Extraction Trenches 19 and 20 began with the removal of the clay layer along the alignment of the trench. Because the design depth of Extraction Trench 19 extended below the reach of the trencher, this trench was excavated an additional 10 feet below ground surface. This created a bench for the trenching machine to run safely along and excavate the remainder of the trench down to the design depth. Table 1 lists the lengths and depths of each trench. The trenching machine made an 18-inch wide cut down to the bottom of the trench while simultaneously installing a 6-inch diameter, perforated high-density polyethylene (HDPE) pipe wrapped in filter fabric at the bottom of the trench. As the trench progressed, the cut was backfilled around and above the pipe with coarse sand. The perforated pipe facilitates the collection of the groundwater by the extraction wells. A 30-foot long cleanout constructed of solid pipe was installed at one end of the collection pipe and brought to the ground surface. At the other end of the trench, the collection pipe connected to an end well. Details of the installation and connection to the end well are provided in Section 2.1.2.

Advanced Drainage Systems, Inc. of Columbus, Ohio manufactured the pipe. The sand backfill which was supplied by The Levy Company (was installed in the trench around and above the pipe). Construction methods for the trenches are included with the construction documentation provided by CDS (Appendix B). The locations of the trenches are shown on Figure 2.

Extraction Trench 19. The constructed trench is 153 feet long. The depth of the trench is approximately 27.5 feet. A summary of the collection piping invert elevations is presented in Table 2.

Extraction Trench 20. The constructed trench is 361 feet long. Because of reconstruction activities associated with the cleanout, the actual effective length of the trench, measured from EW-20 to EW-20C, is 259 feet. Depths of the trench vary from 13 to 16.6 feet. A summary of the collection piping invert elevations is presented in Table 2. On February 13, 2001, during the construction of Extraction Trench 20, the end of the horizontal collection pipe installed at the bottom of the trench separated from the non-perforated pipe as CDS was installing the trench cleanout. The location of the break occurred near EW-20C, which is located at the eastern end of the trench. CDS attempted to recover the pipe by excavating around the area. However, the attempts were unsuccessful due to continuous soil sloughing near the water table. MWH decided to postpone repairs to the cleanout until the groundwater elevation could be lowered by the other components of the expanded BWES. CDS returned to the site from July 16 to July 20, 2001 to repair the cleanout. CDS excavated in the area and located the end of the HDPE tile. The cleanout was extended to the surface from that point. The excavation was backfilled with native soil. On July 23, 2001 a video camera was advanced down EW-20 and the cleanout.

The video camera indicated that the cleanout was not passable. To correct the impassible pipe, extraction well EW-20C was reconstructed in November 2001 (See section 2.1.2 for details) and the cleanout was abandoned in place and replaced by the manhole for EW-20C. A new manhole was installed (EW-20C) and it allows access to the collection pipe for cleanout. The final effective length of collection pipe in the extraction trench is approximately 259 feet long. To account for the decreased piping length, all four of the extraction wells in Extraction Trench 20 were later equipped with extraction pumps.

2.1.2 Extraction Well Construction

Two types of extraction wells were installed: end wells and intermediate wells. End wells, EW-19 and EW-20, were connected directly to the HDPE collection pipe in the associated extraction trench and installed during construction of the trench. Intermediate wells, EW-19A, EW-20A, EW-20B, and EW-20C, were installed above the collection pipe with a bucket drill rig at locations between the end well and the trench cleanout. EW-13A, an intermediate well, was also installed to replace EW-13 in existing Extraction Trench 13. Detail drawings of both types of wells are included in Figure 5. Construction methods for the end wells are included with CDS construction documentation (Appendix B). Table 1 lists the construction details for each well. Locations of the wells are shown on Figure 2 and coordinates of the wells are included on Figure 3.

End wells were attached to the 6-inch diameter collection pipe via a stainless steel nipple attached to the sump of the end well. The well and the pipe were then released from the trencher when the machine had cut into the ground to the specified depth. The area around the well was then backfilled with a clean, coarse sand filter pack, supplied by The Levy Company, Inc. of Portage, Indiana.

Intermediate wells were installed using a 30-inch diameter bucket drill rig. The bucket rig excavated a 24-inch diameter borehole to a depth approximately 12 to 24 inches above the trench collection pipe. The design distance of 12 inches was expanded because the increased distance would not impact the system's extraction capacity; however, it would minimize the potential for damaging the collection pipe. The well was then installed in the borehole. The length of the screen and riser pipe were measured and used to confirm the depth of the borehole. The well was constructed of 8-inch diameter, Type 304 stainless steel screen and riser body manufactured by Cook Screen Technologies, Inc. of Minneapolis, Minnesota. The screens are 10 feet long with a slot size of 0.010 inches. A clean, coarse sand filter pack was installed around the well to 1.5 feet above the top of screen. A 2-foot thick layer of bentonite chips was installed on top of the sand. The Hydrogel bentonite was supplied by Wyo-Ben, Inc. of Billings, Montana.

At both end well and intermediate well locations, a watertight concrete manhole was installed. The manholes were prefabricated by Kerkstra Precast, Inc. of Jenison, Michigan. The bottom of the manhole was set at a minimum of 6 feet below grade on top of a one-foot thick layer of gravel bedding. Concrete was poured between the well casing and concrete manhole to create a watertight seal.

Each well was developed on March 7, 2001 to remove fines from the filter pack. The wells were developed by purging water from each well, allowing the well to recharge and then purging the well again. These activities were accomplished using a 3,000-gallon vacuum truck. The suction piping was extended to the bottom of the well to increase effectiveness of removing any solids that were present. The purged water was transported to the on site GWTP for treatment.

EW-13A. Extraction Well EW-13A was installed to replace EW-13, which had previously become plugged. The new well was located at the midpoint of Extraction Trench 13. The installation of EW-13A was completed on February 16, 2001. The manhole was set over the well on February 19, 2001.

EW-19, EW-19A. Extraction Wells EW-19 and EW-19A were constructed along Extraction Trench 19. EW-19, an end well, was installed at the northern end of Extraction Trench 19 and was completed on February 21, 2001. EW-19A is an intermediate well and was installed 76 feet south of EW-19 on February 28, 2001. The manholes were set over these wells on February 28, 2001.

EW-20, EW-20A, EW-20B, EW-20C. Four wells were constructed along Extraction Trench 20. CDS completed the installation of intermediate wells, EW-20A, EW-20B, and EW-20C on February 14 and 15, 2001. EW-20, the end well, was constructed at the end of Extraction Trench 20 on February 21, 2001. Manholes were set over these wells on February 20 and 21, 2001.

EW-20C Reconstruction. Operation of the BWES indicated Extraction Trench 20 was not performing as designed. Flow from the well did not meet the design extraction rate of seven gpm in a sustainable manner and it was suspected that the drain tile had become separated from the end well, EW-20, or the pipe had been crushed during installation. MWH requested that CDS perform additional work to increase the flow from Extraction Trench 20 to the design rate.

CDS returned to the site from October 29, 2001 to November 9, 2001. At this time, EW-20C was reconstructed. CDS located the horizontal pipe below the EW-20C location and installed a 48-inch diameter manhole that extended to one foot below the 6-inch drain tile. The tile was attached to the sump one foot above the bottom of the manhole with a PSX positive seal gasket. Detail 2 on Figure 5 provides final construction details of EW-20C. The excavation was backfilled with native soils and the clay cover was restored over the area. Great Lakes Environmental Testing tested compaction of the clay cover on November 8, 2001. Topsoil removed prior to the excavation was placed on top of the compacted clay.

2.1.3 Dewatering

Dewatering was required during activities associated with the repair of the Extraction Trench 20 cleanout and the reconstruction of EW-20C. Water was removed during the EW-20C excavation using either a system of well points or a trash pump. The water was piped through a 6-inch diameter polyvinyl chloride (PVC) pipe to the GWTP for treatment.

2.1.4 Contaminated Soils Handling

Excavated soil from the trenching and excavation activities was used as backfill to the extent possible. Excess soil was placed in the Off-Site Area in the area indicated on Figure 2. The soil stockpile was covered with non-contaminated soil to prevent precipitation from contacting the waste materials and was covered by the Off-Site Area interim cover in August 2001.

The contaminated soils that were removed for the EW-20C reconstruction were temporarily placed on plastic sheeting during construction activities. After reconstructing EW-20C, the contaminated soils were replaced in the excavation and the interim clay cover was reestablished.

2.1.5 Site Restoration

Restoration of the construction area included removing debris and restoring areas used to pre-construction conditions (excavations backfilled to surrounding grade, no contaminated soil left above the cover, no tire ruts, etc.) with the exception of vegetation. Restoration was conducted in multiple phases because of the nature of the work and multiple demobilization phases. Following the initial construction of the trenches and wells, CDS restored the construction areas to original grade prior to demobilizing from the site on March 2, 2001.

Additional restoration efforts were required following the reconstruction of EW-20C. Because the interim cover (composed of an 18-inch thick clay layer and a six-inch topsoil layer) were already installed at the time of the reconstruction of EW-20C, restoration included reinstallation and compaction of the clay layer. The clay was placed in 8-inch loose lifts resulting in a minimum thickness of 18 inches. The clay was compacted to a minimum density of 95% of the maximum laboratory density at a moisture range from 14.5% to 17.5%. Eight compaction tests were performed at four locations (two tests at different depths per location) by Great Lakes Soil & Environmental Consultants, Inc. The results of these tests are included in Appendix G. The six-inch topsoil layer was replaced and graded by CDS on

November 8, 2001. Note that geotechnical sample results from the clay placed in 1996 and the clay placed in 2001 were evaluated to determine the Proctor density and optimum moisture for this reconstruction activity.

MWH contracted Slusser Green Thumb, Inc. of Logansport, Indiana to install sod in the area around EW-20C in November 2001.

2.1.6 Quality Control

Material testing and quality control measures were performed in accordance with the *Construction Quality Assurance Plan* (Montgomery Watson, June 1999) to assure that the extraction trenches and wells met the applicable performance requirements. The following quality control measures were executed prior to and during construction:

- Submittal of manufacturer specifications and approval of construction materials,
- Verification of extraction trench depth,
- Verification of filter sand placement,
- Verification of manhole construction, and
- Verification of trench operation.

Manufacturer specifications for the materials used during construction were submitted to and approved by MWH prior to construction. The manufacturer's specification sheets are included in Appendix F.

The depth of the extraction trench was physically verified every 80 feet of trench length using a depth gauge-rod. This interval represents a variation from the work plan submitted by CDS. The work plan specified the trench depth be verified every 20 feet. This change was approved by MWH to limit worker exposure resulting from high VOC concentrations detected by air monitoring during trenching activities. However, the depth was verified continuously in a non-intrusive manner by attaching a surveying laser-receiving rod to the trencher boom and monitoring the boom depth (and trench depth) with a laser level. Verification of the correct placement of filter sand in each trench is detailed in Page 4 of Appendix B.

MWH personnel were present during the installation of the manholes above each extraction well and inspected the final construction of the manholes to verify they were installed correctly.

Due to initially low extraction rates from Extraction Trench 20, a video camera was advanced down EW-20 and the cleanout on July 23, 2001 following the first repair attempt. The objective of the video investigation was to locate potential blockage in the pipe resulting from sediment buildup or broken or pinched pipe. The video camera indicated that the cleanout was not passable. As a result of this investigation, the extraction trench, including EW-20C, was reconstructed as detailed in Section 2.1.1 and Section 2.1.2. The viability and integrity of the entire trench system (collection piping, end wells, and intermediate wells) was verified at each location during initial operation of the extraction pumps.

2.1.7 Health and Safety

The work associated with the installation of the conveyance piping was performed in accordance with the site-specific Health and Safety Plan (HASP) and CDS's HASP submitted to MWH prior to mobilizing to the site. CDS's HASP was submitted as part of the *Final Slurry Wall Design, Separation Barrier Wall Installation* (Hanson Engineering, January 6, 2001).

Toolbox Safety Meetings were held each morning with all work crews on site for the day prior to beginning work. The CDS project manager or the MWH Site Health and Safety Officer conducted the meetings. Topics at the meetings included identification of the various work crews on site, safety concerns related to the day's activities, general health and safety subjects, and site-specific protocols.

CDS and Hanson Engineering monitored concentrations of VOCs in worker breathing zones and in areas adjacent to the activities using a photoionization detector (PID). Daily air monitoring logs submitted to MWH by Hanson Engineering are incorporated with the Daily Field Reports in Appendix D. MWH personnel were on site throughout the construction activities and conducted regular quality assurance air monitoring along the perimeter of the exclusion zone. The air monitoring data collected by MWH was consistent with the Hanson data. The MWH data was not recorded.

2.2 CONVEYANCE AND UTILITY PIPING INSTALLATION

Twenty high-density polyethylene (HDPE) pipes of various diameters were installed to connect the GWTP to the new BWES extraction wells and the locations of the ISVE blower sheds. Table 3 lists the number, diameter, location and purpose of each pipe.

MWH selected Koester Environmental Services, Inc. (KES) of Evansville, Indiana to install the conveyance and utility piping. KES began installation of the underground piping on February 12, 2001. KES demobilized from the site on March 15, 2001 after completion of the work.

A Photograph Log of the construction of the extraction trenches and wells is included as Appendix E.

2.2.1 Piping Installation

In preparation for the installation of the conveyance and utility piping, MWH constructed the piping vault located on the eastern side of the GWTP. This vault was constructed during the upgrades to the GWTP in 2000. The vault included numbered piping terminations connected to GWTP influent manifold system.

KES began excavation of the pipe trench at the vault on February 12, 2001. The trench was excavated to four feet below grade. The majority of the trench was excavated using a hydraulic track machine. A rubber-tired backhoe/loader was used for backfill and some excavation.

From the piping vault, the trench extended east across the ACS site fence and penetrated the perimeter barrier wall. Details of the penetration are provided in Section 2.2.3. From the perimeter barrier wall, the trench extended approximately 20 feet farther east and terminated. Pipes for the On-Site BWES and ISVE systems would terminate at this point. The trench continued south along an ACS facility road and across the southern ACS site fence to the railroad tracks that bisect the ACS site. The trench crossed the railroad tracks at this location. Details of the railroad crossing are provided in Section 2.2.2. From the railroad tracks, the trench continued south and penetrated the separation barrier wall. Details of this penetration are provided in Section 2.2.3. The piping trench continued to EW-11. Two trenches continued on from EW-11. One trench extended south and east to the future location of the Off-Site Area ISVE system blower shed. The other trench was excavated to the east to EW-20, EW-20A, EW-20B, and EW-20C. This trench then turned south and connected to EW-16, EW-15, EW-19, and EW-19A.

The conveyance and utility piping installed was Plexco HDPE pipe, supplied by Forrer Supply Co., Inc. of Germantown, Wisconsin. Central Plastics Company of Shawnee, Oklahoma supplied fittings. The HDPE piping was fused via the thermal butt-fusion technique using McElroy No. 28 and No. 412 Hydraulic Fusion Machines and then laid in the trench and backfilled with excavated material. The locations of the pipe welds were recorded and are indicated on Figures 2 and 3. Procedures for fusion of the piping and fittings conformed to the specifications of the piping manufacturer.

The pipes were connected to the 20 numbered piping terminations in the piping vault. Locations of the terminations for each pipe was listed in Table 3 and shown on Figure 2. Figure 4 is a piping plan that depicts the configuration of the pipes. Terminated pipes that were not connected to existing components of the BWES were sealed and numbered for future use.

2.2.2 Piping Installation Beneath Railroad Tracks

Trenching beneath a set of three railroad tracks separating the On-Site and Off-Site Areas was required to connect the conveyance piping in the Off-Site Area to the GWTP. The tracks were removed by a subcontractor to the ACS facility. After removal, KES trenched through the area and installed four corrugated steel pipe culverts on February 19, 2001. These culverts will allow for structural stability under the railroad tracks. The culverts were supplied by C&M Pipe Supply of Lynwood, Illinois and manufactured by Contech Construction Products, Inc. KES installed the HDPE piping through the culverts. The railroad bed was backfilled and compacted in 6-inch to 8-inch thick lifts to preexisting grade on February 19, 2001. Compaction was accomplished using both a vibrating plate compactor and a jumping jack compactor. K&S Engineers, Inc. of Highland, Indiana, a subcontractor of KES, tested the compaction of the railroad bed on February 20, 2001. Compaction results, included in Appendix G, indicate the railroad bed was compacted to a minimum 95% of the Proctor Density. The railroad bed was finished and the tracks were replaced by the ACS subcontractor.

2.2.3 Barrier Wall Penetrations

The trench and piping penetrated both the perimeter barrier wall directly east of the GWTP and the separation barrier wall near the center of the site. The locations of both penetrations are indicated on Figure 2 and 3.

The penetration through the 60-mil HDPE liner of the perimeter barrier wall was accomplished by fusing a pre-fabricated bulkhead to the existing HDPE layer. KES installed the HDPE bulkhead by fitting a collar over the existing pipes, extrusion welding the base sheet to the existing liner, and then extrusion welding the individual collars to the pipes as they penetrate the bulkhead. KES utilized the extrusion welder to seal the penetration circumference of each pipe. The excavation was sealed with bentonite supplied by MWH and backfilled to ground surface with native soil and gravel.

During a rain event during the night of February 7, 2001, rainwater accumulated in the piping trench at the location of the barrier wall penetration. The U.S. EPA was notified by telephone and the water was pumped from the trench to the on-site groundwater treatment system to allow construction to continue. As a precaution the water was processed through the groundwater treatment system.

KES penetrated the Separation Barrier Wall at the location shown on Figures 2 and 3. The penetration in the separation barrier wall was sealed so as not to compromise the hydraulic integrity of the wall. The excavation near the penetration was backfilled in the same manner as the perimeter barrier wall penetration.

2.2.4 Influent Manifold

From July 23 through 27, 2001, Consolidated Fabrication & Constructors of Gary, Indiana completed the construction of the influent header manifold in the GWTP. The header system was designed to direct the influent water from each extraction well grouping and ISVE knockout tank to either the oil/water separator or the aeration tank in the GWTP for proper treatment.

The manifold is constructed of two-inch and three-inch diameter PVC piping. Stainless steel, 1½-inch diameter ABB Water Meters, Inc. flow meters (Models S150 and S200) were installed on each influent line. Austgen Electric, Inc. provided conduit and wiring from the new flow meters to the GWTP programmable logic controller (PLC).

Photograph Number 63 in Appendix D shows the completed header system.

2.2.5 Extraction Pump Piping Installation

Within each extraction well manhole, KES assembled a series of stainless steel pipes, hoses, Neptune T-10 flow meters, and sample taps that connect the extraction pumps to the HDPE conveyance piping. Detail 1 on Figure 5 shows a typical assembly. MWH installed the pumps as detailed in Section 2.3.

2.2.6 Dewatering

Dewatering was not necessary during the trenching activities by KES because most of the pipe installation remained above the water table. The only exception was on February 26, 2001, after a period of heavy rain. At this time, the water was removed from the excavation via a pump and delivered to the GWTP for treatment.

2.2.7 Material Testing and Quality Control

Material testing and quality control measures were taken in accordance with the *Construction Quality Assurance Plan* (Montgomery Watson, June 1999) to assure that the piping met the applicable performance requirements. The following quality control measures were executed prior to and during construction:

- Submittal of manufacturer specifications and approval of construction materials,
- Observation of thermal butt fusion process,
- Verification of integrity of HDPE pipe,
- Verification of integrity of HDPE bulkhead at barrier wall penetration, and
- Testing of backfill and compaction of railroad bed.

Manufacturer specifications for the materials used during construction were submitted to and approved by MWH prior to construction. The manufacturer's specification sheets are included in Appendix F.

MWH regularly inspected the thermal butt-fusion process to verify construction procedures were not damaging the pipes.

The integrity of the pipe welds and connections was verified by pressure testing. Pressurized air was directed to each of the lines until the pressure in the pipe was 95 pounds per square inch (psi). This pressure was held for a minimum of 15 minutes at each location. MWH personnel observed the pressure tests, which were completed for all piping by March 14, 2001.

The hydraulic integrity of the barrier wall penetration was tested on February 23, 2001. The excavation at that location was filled with water on one side of the barrier wall's HDPE layer. The HDPE layer was inspected for leaks for approximately 24 hours. No leaks were observed so the seal was deemed complete and the excavation was backfilled.

Upon backfill and compaction of the railroad bed, compaction testing was performed on February 20, 2001 by K&S Engineers, Inc. of Highland, Indiana. Compaction tests were taken at three locations and, with the exception of one location, the tests indicated compaction was greater than 95% of the Maximum Proctor Density. The one location that failed to meet the specification was located in the center of the rail track. The area was recompacted and retested; the second test indicated compaction was greater than 95%. The compaction testing results are included in Appendix G.

2.2.8 Health and Safety

The work associated with the installation of the conveyance piping was performed in accordance with the site-specific HASP and KES's HASP submitted to MWH prior to mobilizing to the site.

Toolbox Safety Meetings were held each morning with all work crews on site for the day prior to beginning work. The KES project manager or the MWH Site Health and Safety Officer conducted the meetings. Topics discussed at the meetings included identification of the various work crews on site, safety concerns inherent to the day's activities, general health and safety subjects, and site-specific protocols.

Regular air monitoring was conducted throughout the installation of the conveyance piping. KES monitored concentrations of VOCs in worker breathing zones and in areas adjacent to the activities using a PID. Because the PID is a direct read instrument, documentation of the readings is not available. Appropriate exclusion zones were established and personal protective equipment (PPE) was worn as required and in accordance with the HASPs. MWH personnel were on site throughout the construction activities and conducted regular quality assurance air monitoring along the perimeter of the exclusion zone.

2.3 PUMPS, CONTROLS, AND INSTRUMENTATION

2.3.1 Electrical Installation

Original plans called for an electrical line to be routed from the GWTP to EW-11 through pipe #21. From EW-11, power would then be distributed to each extraction well in the Off-Site Area through pipe #21. This would have required the electrical service at the GWTP to be upgraded. MWH determined the installation of a new service in the Off-Site Area by Northern Indiana Public Service Company (NIPSCO) would be more cost effective. The new service would supply power directly to a motor control center located in the Off-Site Area ISVE blower shed.

MWH contracted Austgen Electric of Griffith, Indiana to install electrical and control wiring for the BWES Upgrades in the Off-Site Area. To provide power until NIPSCO could install the new service, Austgen Electric installed a temporary underground electric line from a temporary power pole located 30 feet from EW-20C to Extraction Well EW-20C. From EW-20C, power was distributed to the other extraction pumps in the Off-Site Area. Austgen also installed electrical enclosures at each extraction well in the Off-Site Area.

NIPSCO completed the installation of a power pole and metering box for permanent power along Colfax Road near the southwest corner of the Off-Site Area on November 8, 2001. Midwest Environmental Inc. of Hammond, Indiana buried an electrical conduit between the new power pole and control box in the Off-Site Area on November 7, 2001. The location of the electrical conduit is shown on Figure 2.

On November 15, 2001, Austgen installed a 400-Amp, 480/277-Volt electrical line in the conduit and a motor control center in the blower shed. Austgen also installed 480-Volt electrical line from the blower shed to EW-20C at this time completing the installation of power and controls to the BWES pumps.

As-built drawings prepared by Austgen are included as Appendix H.

2.3.2 Pump Installation

On March 12 and 13, 2001, MWH installed the upgraded groundwater extraction pumps and associated plumbing in the newly constructed extraction wells. The pumps are Berkeley ½-hp, single phase, 4-inch diameter submersible pumps. Manufacturer specification sheets for the pumps are included in Appendix F. The pumps were installed in EW-11, EW-12, EW-13A, EW-15, EW-16, EW-19, EW-20, EW-20A, EW-20B, and EW-20C. A one-inch diameter valve and union were installed for future use in the manhole of EW-19A, which did not receive a pump. KES assembled the piping and appurtenances connecting the pump to the conveyance pipes.

2.3.3 Pump Control and Instrumentation

Following completion of the wells and installation of the pumps, Austgen Electric mounted NEMA 12 Hoffman electrical enclosures on top of each manhole. Detail drawings of the enclosures and a single-line drawing showing the electrical distribution from the NIPSCO service box are provided in Appendix H. Franklin Electric Pumptec-Plus pump protection systems were installed in each enclosure. These systems continuously monitor motor power and line voltage to protect the pumps from damage caused by a dry well, clogging, and high or low line voltage. Specifications for the Pumptec-Plus are included in Appendix H. Also included in the enclosures are transformers to step the incoming 480V power to 230V for the extraction pumps.

The GWTP Programmable Logic Controller (PLC) controls the operation of the pumps. Operation of the pumps is controlled through the PLC by a permissive signal based on the water level in Tank T-102 that is set by the operator. The pumps will activate when a low-level in T-102 is activated. The pumps will shut off when a high-level in T-102 is activated. The pumps will also be locked out by various alarm conditions in the plant, including numerous high-level alarms. For a more detailed discussion on the GWTP and pump control logic, see the *Operation and Maintenance Manual for the Groundwater Treatment Plant* (MWH, February 2002).

3.0 REFERENCES

MWH. *Final Remedial Design Report.* August, 1999.

MWH. *Separation Barrier Wall Installation Construction Completion Report.* March, 2002.

MWH. *Construction Quality Assurance Plan* (CQAP). June, 1999.

Hanson Engineering. *Final Slurry Wall Design, Separation Barrier Wall Installation.* January 6, 2001.

MWH. *Operation and Maintenance Manual for the Groundwater Treatment Plant.* February 2002.

CAD/RAA/TMK/RAA/PJV/jmf/JDP/jmf
J:\209\0601 ACS\0106 BWES Off_Site\6010106a026.doc

Table 1
Extraction Trench Construction Details
ACS NPL Site
Griffith, Indiana

Trench ID	Location			Length of Trench (feet)	Ground Surface Elevation[1] (ft. amsl)	Bottom of Trench Elevation (ft. amsl)	Depth of Trench at Well (ft. bgs)	Pipe Invert Elevation (ft. amsl)	Approximate Confining Clay Layer Elevation (ft. amsl)
	Benchmark	Northing	Easting						
Extraction Trench 19	EW-19	5904.60	5483.40	153	647.76	620.30	27.46	NA	621
	EW-19A	5847.80	5432.30		648.51	622.00	26.51	622.00	621
	Cleanout	5795.29	5376.13		649.91	NA	NA	NA	621
Extraction Trench 20	EW-20	6507.80	5265.60	361[2]	636.60	619.98	16.62	NA	619
	EW-20A	6489.00	5346.30		636.98	619.85	17.13	619.85	619
	EW-20B	6455.10	5432.20		637.92	623.00	14.92	623.00	619
	EW-20C	6416.40	5515.70		638.14	624.59	13.55	624.59	619
	Cleanout	6355.60[3]	5598.10[3]		NA	NA	NA	NA	619

Notes:
[1]Ground Surface Elevation, taken during construction completion survey, may not reflect current conditions.
[2]The length is approximate due to reconstruction activities.
[3]Approximate coordinates based on GPS-derived data.

NA = Not available
ft. bgs = feet below ground surface
ft. amsl = feet above mean sea level

Table 2
Extraction Well Construction Details
ACS NPL Site
Griffith, Indiana

Well ID	Location		Bottom of Screen Elevation (ft. amsl)	Top of Casing Elevation (ft. amsl)	Ground Surface Elevation[1] (ft. amsl)	Top of Manhole Elevations[2] (ft. amsl)	Depth of Trench at Well (ft. bgs)	Pipe Invert Elevation (ft. amsl)	Approximate Confining Clay Layer Elevation (ft. amsl)
	Northing	Easting							
EW-13A	5927.80	5042.80	629.93	641.14	643.31	646.55	NA	627.50[3]	621
EW-19	5904.60	5483.40	620.30	645.38	647.76	650.65	27.46	NA	621
EW-19A	5847.80	5432.30	624.12	647.34	648.51	652.48	26.51	622.00	621
EW-20	6507.80	5265.60	619.10	634.51	636.60	639.86	16.62	NA	619
EW-20A	6489.00	5346.30	623.68	635.04	636.98	640.23	17.13	619.85	619
EW-20B	6455.10	5432.20	625.19	635.49	637.92	640.97	14.92	623.00	619
EW-20C	6416.40	5515.70	626.99	637.33	638.14	642.33	13.55	624.59	619

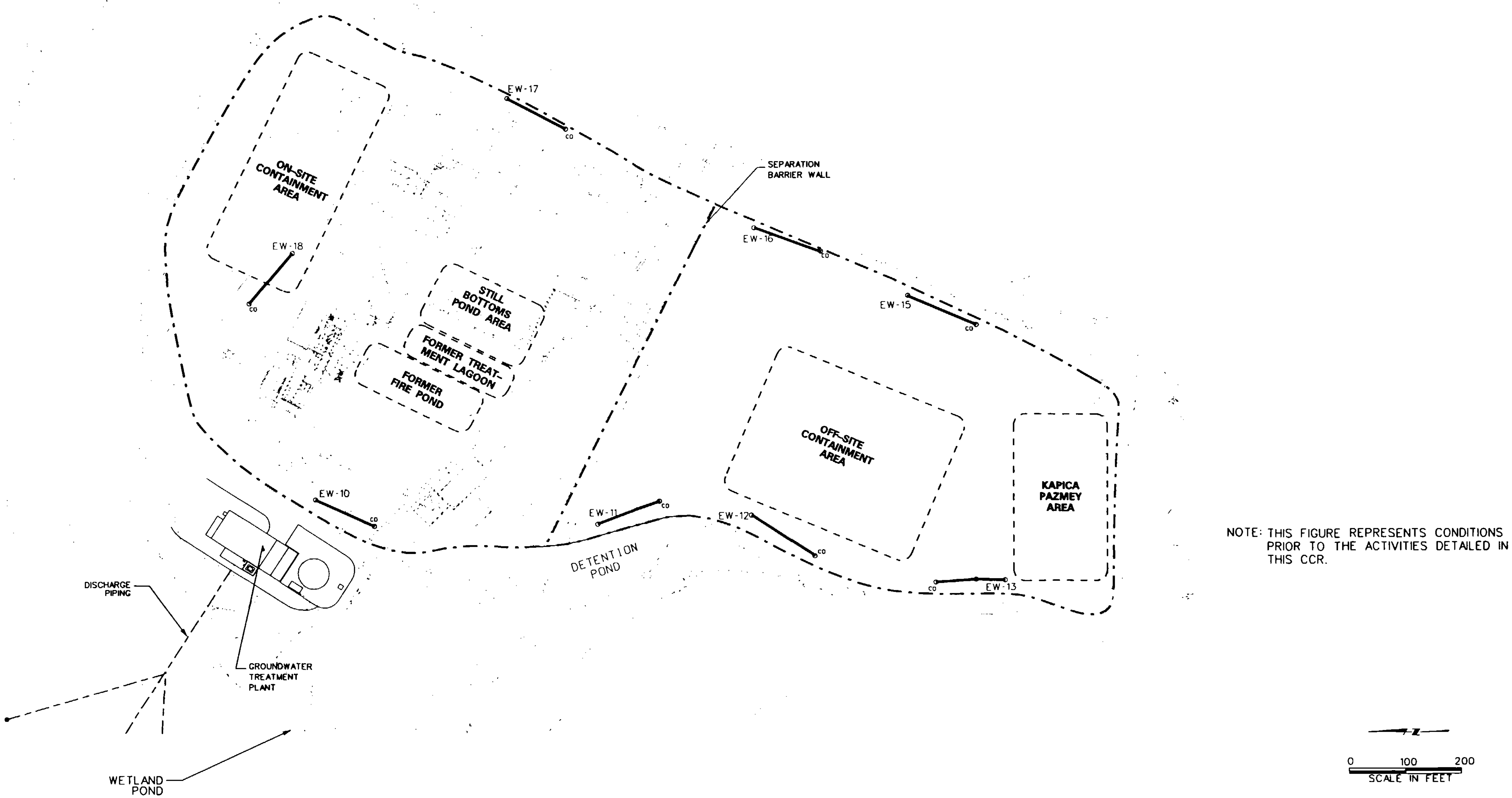
Notes:
[1]Ground Surface Elevation taken during construction completion survey, may not reflect current conditions.
[2]Top of Manhole Elevation taken from top of manhole cover.
[3]Elevation is estimated.

NA = Not available
ft. bgs = feet below ground surface
ft. amsl = feet above mean sea level

Table 3
Conveyance Piping Inventory
ACS NPL Site
Griffith, Indiana

Pipe No.	Diameter (inches)	Termination Location	Function
2	2	Connected to existing conveyance pipe from EW-10, EW-17, and EW-18	Receive flow from EW-10, EW-17, and EW-18
3	3	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
4	2	Connected to EW-16, EW-15, EW-19, and EW-19A	Receive flow from EW-15, EW-16, EW-19, and EW-19A
5	2	Penetrated EW-11 manhole and continued to EW-12 and EW-13A	Receive flow from EW-11, EW-12, and EW-13A
6	2	Penetrated EW-11 manhole and continued to EW-12 and EW-13A along west side of site and EW-20, EW-20A, EW-20B, and EW-20C along the north side of the Off-Site Area	Receive flow from EW-20, EW-20A, EW-20B, and EW-20C (Section extending to EW-12 and EW-13A terminates inside EW-11)
7	2	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
8	2	At Off-Site Blower Shed	Off-Site Area ISVE System
9	1	Connected to existing 1-inch diameter pneumatic control line that currently only connects to the On-Site Area wells (EW-10, EW-17, and EW-18) because the Off-Site Area wells were switched to electric pumps	Facilitate future installation of pneumatic pumps in extraction wells
10	2	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
11	2	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
12	8	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
13	8	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
14	2	At Off-Site Blower Shed	Off-Site Area ISVE System
15	2	At Off-Site Blower Shed	Off-Site Area ISVE System
16	8	At Off-Site Blower Shed	Off-Site Area ISVE System
17	8	At Off-Site Blower Shed	Off-Site Area ISVE System
18	2	West of Perimeter Barrier Wall	Future use
19	2	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
20	2	On-Site Area	On-Site Area ISVE and dual-phase extraction systems
21	2	Connected to enclosure mounted above EW-11 and interconnected to the enclosures above all Off-Site Area extraction wells.	Electrical or pneumatic control line

Note: 1. Pipe #1 was installed previously as part of the Perimeter Groundwater Containment System (PGCS).
2. Each pipe begins at the GWTP near the influent header system.



NOTE: THIS FIGURE REPRESENTS CONDITIONS PRIOR TO THE ACTIVITIES DETAILED IN THIS CCR.

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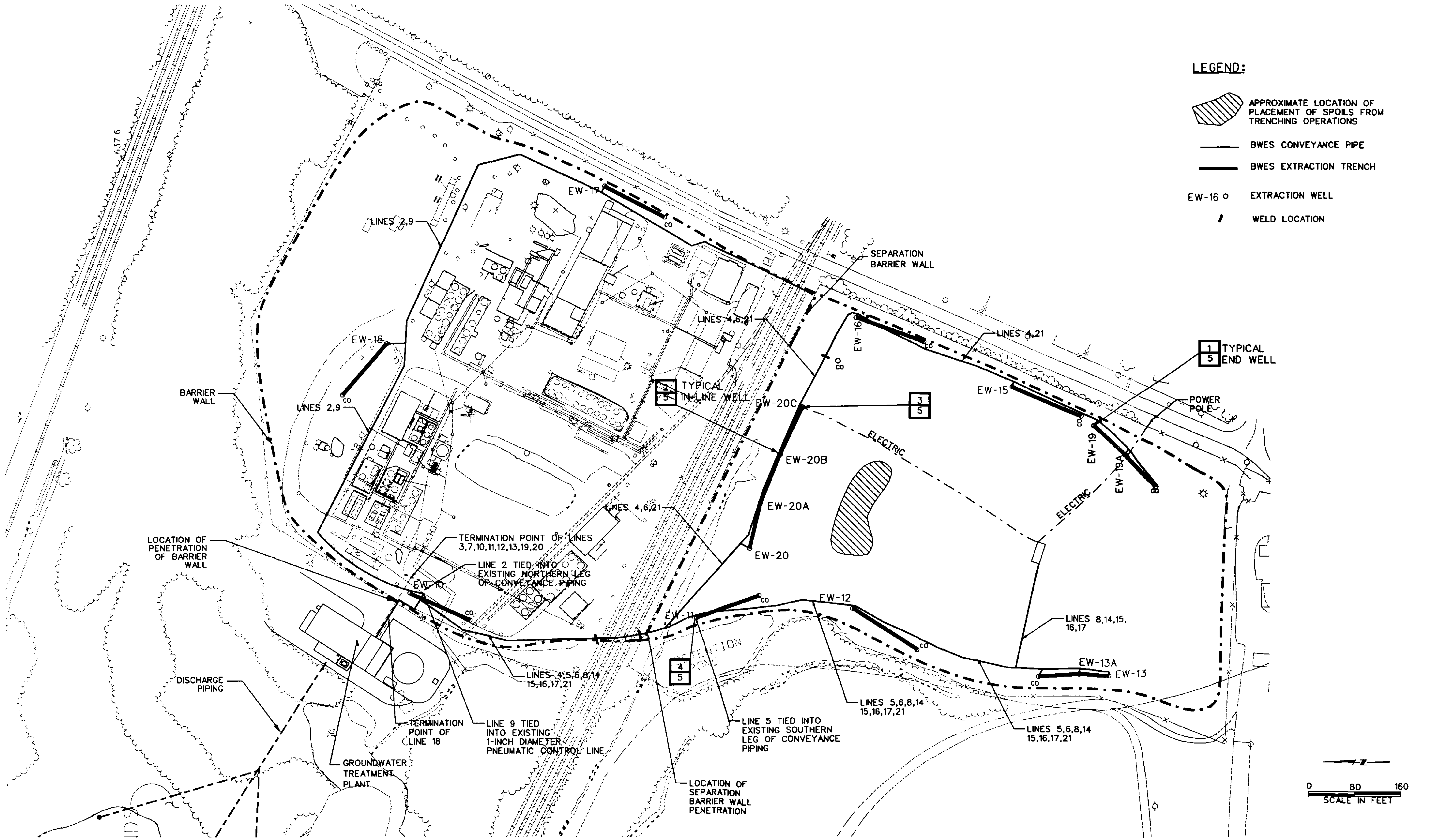

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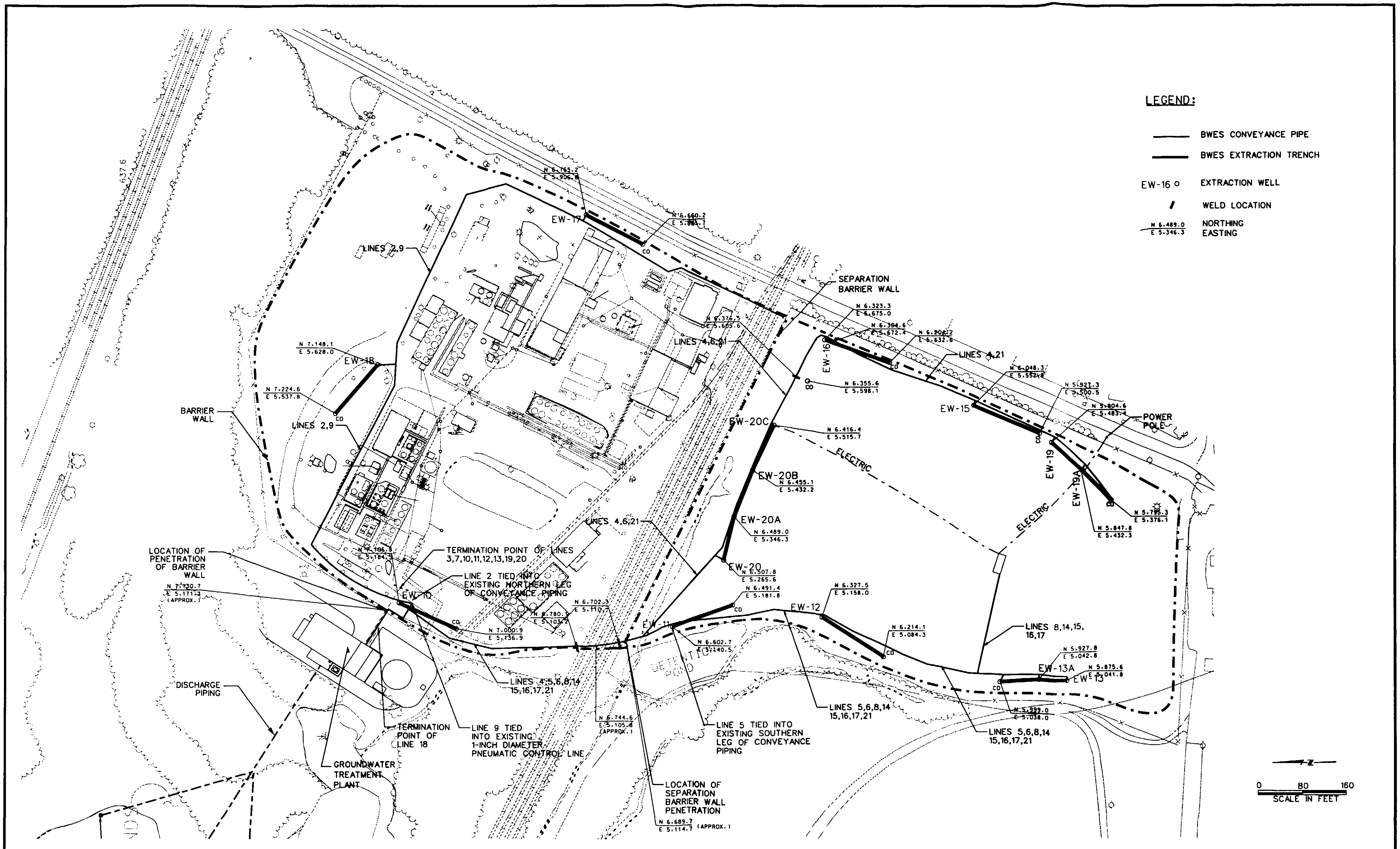

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

DESIGNED RAA
DRAWN RC
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
(COMPANY OFFICER) LICENSE NO. DATE

MWH

BARRIER WALL EXTRACTION SYSTEM:
OFF-SITE AREA UPGRADES
CONSTRUCTION COMPLETION REPORT
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

COORDINATES OF BWES COMPONENTS

FIGURE 3

File: J:/209/0601 ACS/0106 BWES OFFSITE/drawings/BWES COORDINATES.dgn
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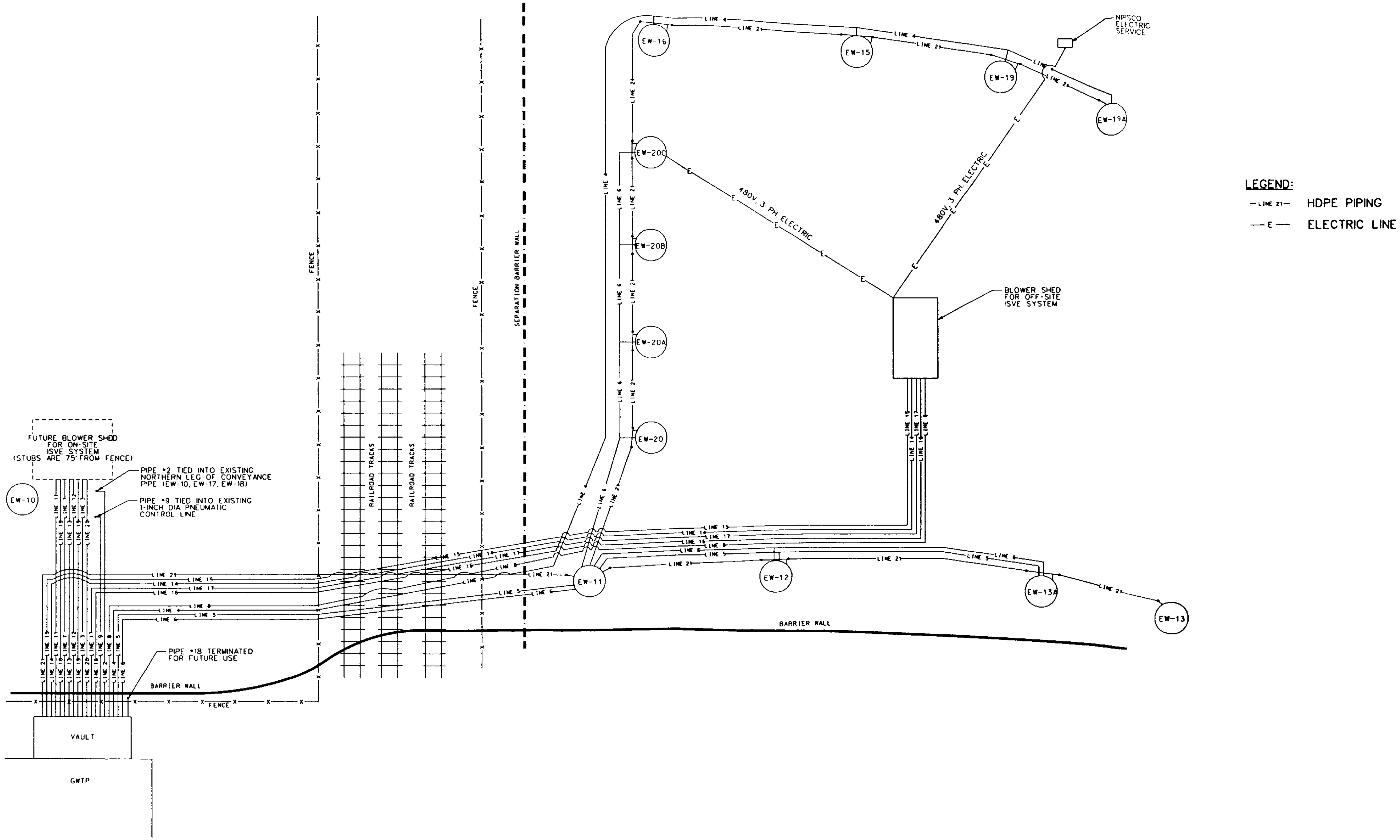

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				N.T.S.	DESIGNED RAA DRAWN RC CHECKED RAA	ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE (COMPANY OFFICER) LICENSE NO. DATE	MWH MONTGOMERY WATSON HARZA	BARRIER WALL EXTRACTION SYSTEM: OFF-SITE AREA UPGRADES CONSTRUCTION COMPLETION REPORT AMERICAN CHEMICAL SERVICE SUPERFUND SITE GRIFFITH, INDIANA	PIPING PLAN	FIGURE 4

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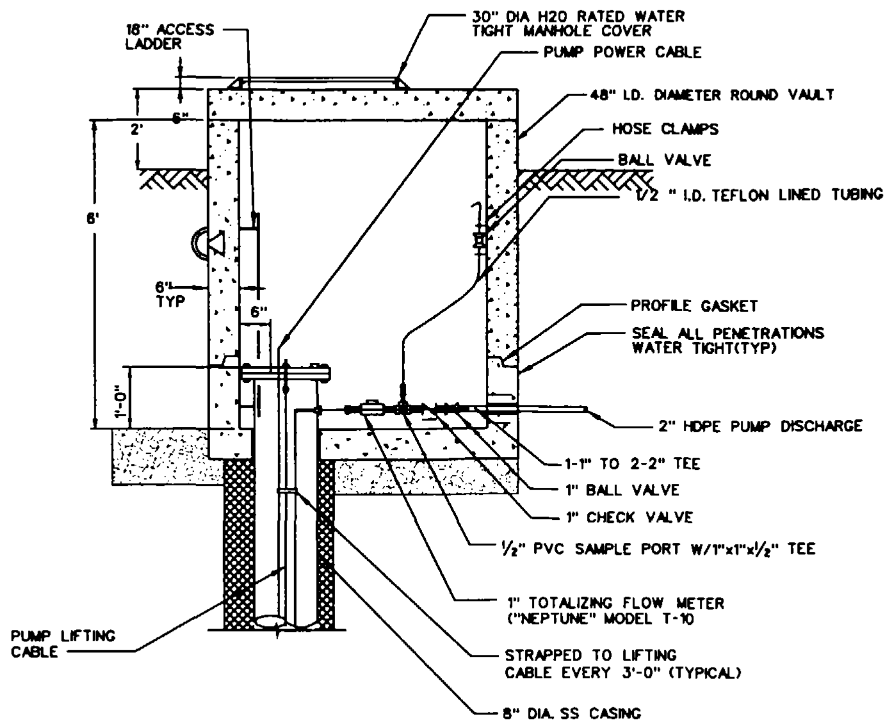
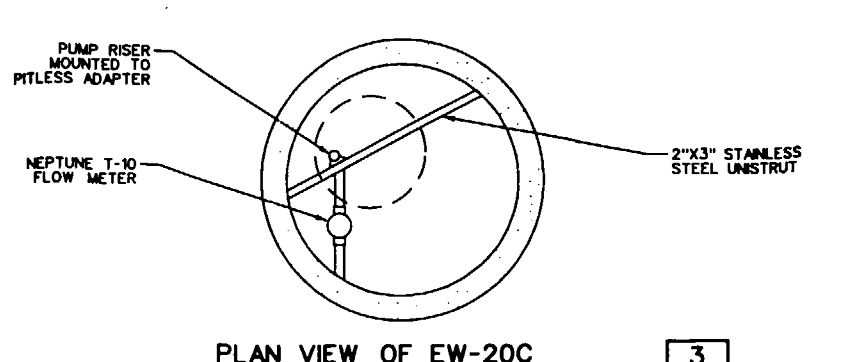
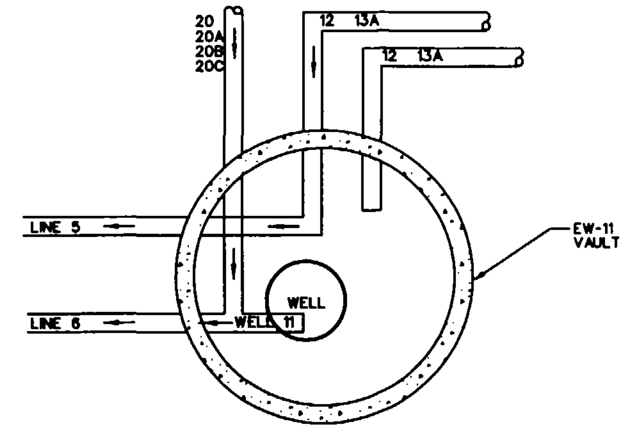


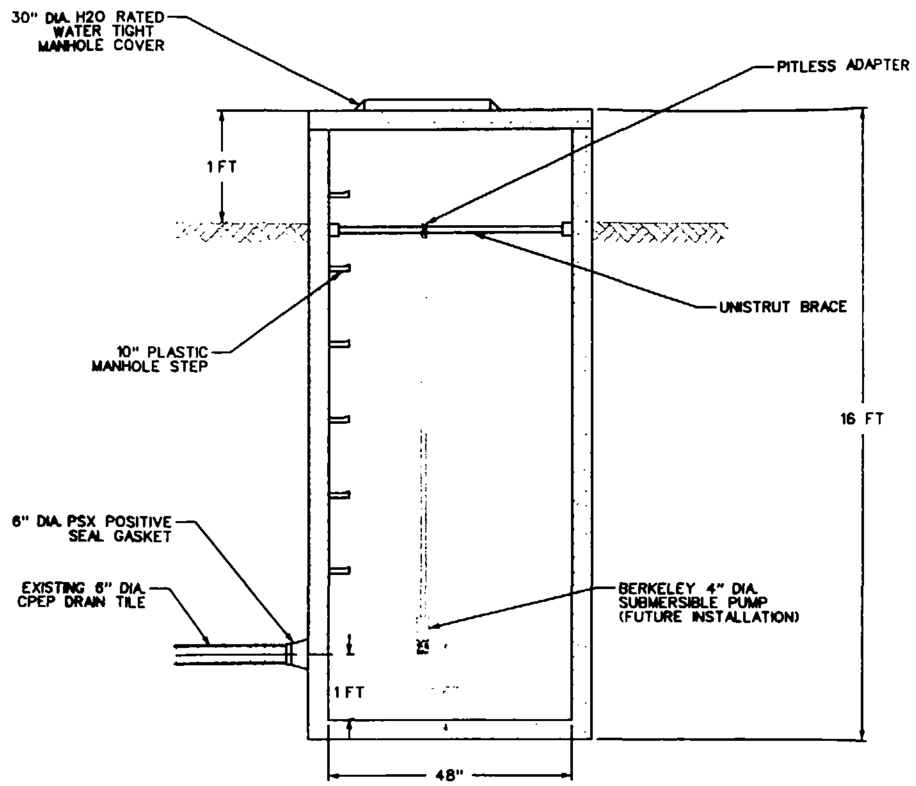
EXTRACTION WELL (TYP.) | 1,2 / 2
NOT TO SCALE



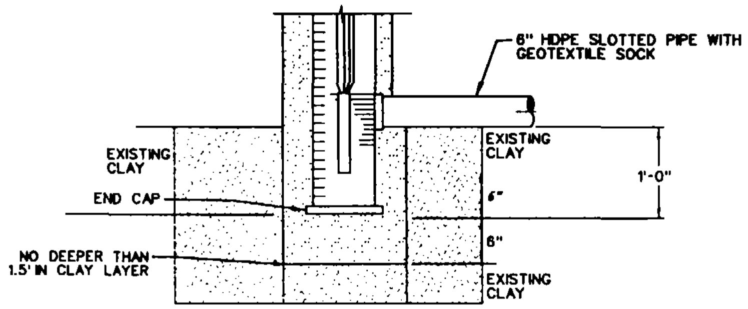
PLAN VIEW OF EW-20C | 3 / 2
NOT TO SCALE



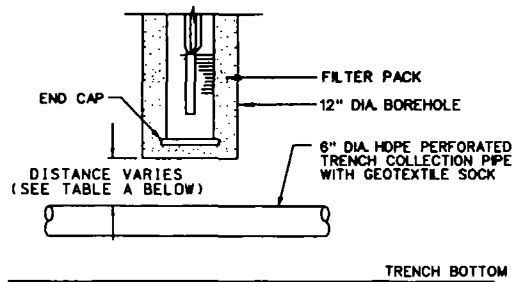
EW-11 FLOW DIAGRAM | 4 / 2
NOT TO SCALE



PROFILE VIEW OF EW-20C | 3 / 2
NOT TO SCALE



END EXTRACTION WELL (TYP.) | 1 / 2
NOT TO SCALE



IN-LINE EXTRACTION WELL (TYP.) | 2 / 2
NOT TO SCALE

TABLE A

EXTRACTION SYSTEM UPGRADE INSTALLATION DEPTHS

LOCATION	LOCATION		BOTTOM OF SCREEN ELEVATION (ft. amsl)	TOP OF CASING ELEVATION (ft. amsl)	GROUND SURFACE ELEVATION (ft. amsl)	TOP OF MANHOLE ELEVATION (ft. amsl)	DEPTH OF TRENCH AT WELL (ft. bgs)	WELL CONFIGURATION	APPROXIMATE ELEVATION OF THE CONFINING CLAY LAYER (FEET AMSL)	DISTANCE BETWEEN TOP OF COLLECTION PIPE AND BOTTOM OF IN-LINE WELL (FEET)
	NORTHING	EASTING								
EW-13A	5927.8	5042.8	629.93	641.14	643.31	646.55	NA	IN-LINE WELL	621	1.93 (ESTIMATED)
EW-19	5904.6	5483.4	620.30	645.38	647.76	650.65	27.46	END WELL	621	NA
EW-19A	5847.8	5432.3	624.12	647.34	648.51	652.48	26.51	IN-LINE WELL	621	1.82
EW-20	6507.8	5265.6	619.10	634.51	636.60	639.86	16.62	END WELL	619	NA
EW-20A	6489.0	5346.3	623.68	635.04	636.98	640.23	17.13	IN-LINE WELL	619	3.33
EW-20B	6455.1	5432.2	625.19	635.49	637.92	640.97	14.92	IN-LINE WELL	619	1.69
EW-20C	6416.4	5515.7	-	-	638.14	642.33	13.55	IN-LINE WELL	619	1.90

GROUND SURFACE ELEVATION TAKEN DURING CONSTRUCTION COMPLETION SURVEY, MAY NOT REFLECT CURRENT CONDITIONS.
TOP OF MANHOLE ELEVATION TAKEN FROM TOP OF MANHOLE COVER.
NA - NOT AVAILABLE
ft. bgs - FEET BELOW GROUND SURFACE
ft. amsl - FEET ABOVE MEAN SEA LEVEL

REV	DATE	BY	DESCRIPTION
1	9/7	JRR	CHANGES TO RFB

SCALE: NONE

DESIGNED RAA
DRAWN RC
CHECKED RAA

SUBMITTED BY
ROBERT A. ADAMS (PROJECT MANAGER) LICENSE NO. DATE
(COMPANY OFFICER) LICENSE NO. DATE

MWH

BARRIER WALL EXTRACTION SYSTEM:
OFF-SITE AREA UPGRADES
CONSTRUCTION COMPLETION REPORT
AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

DETAILS

FIGURE 5

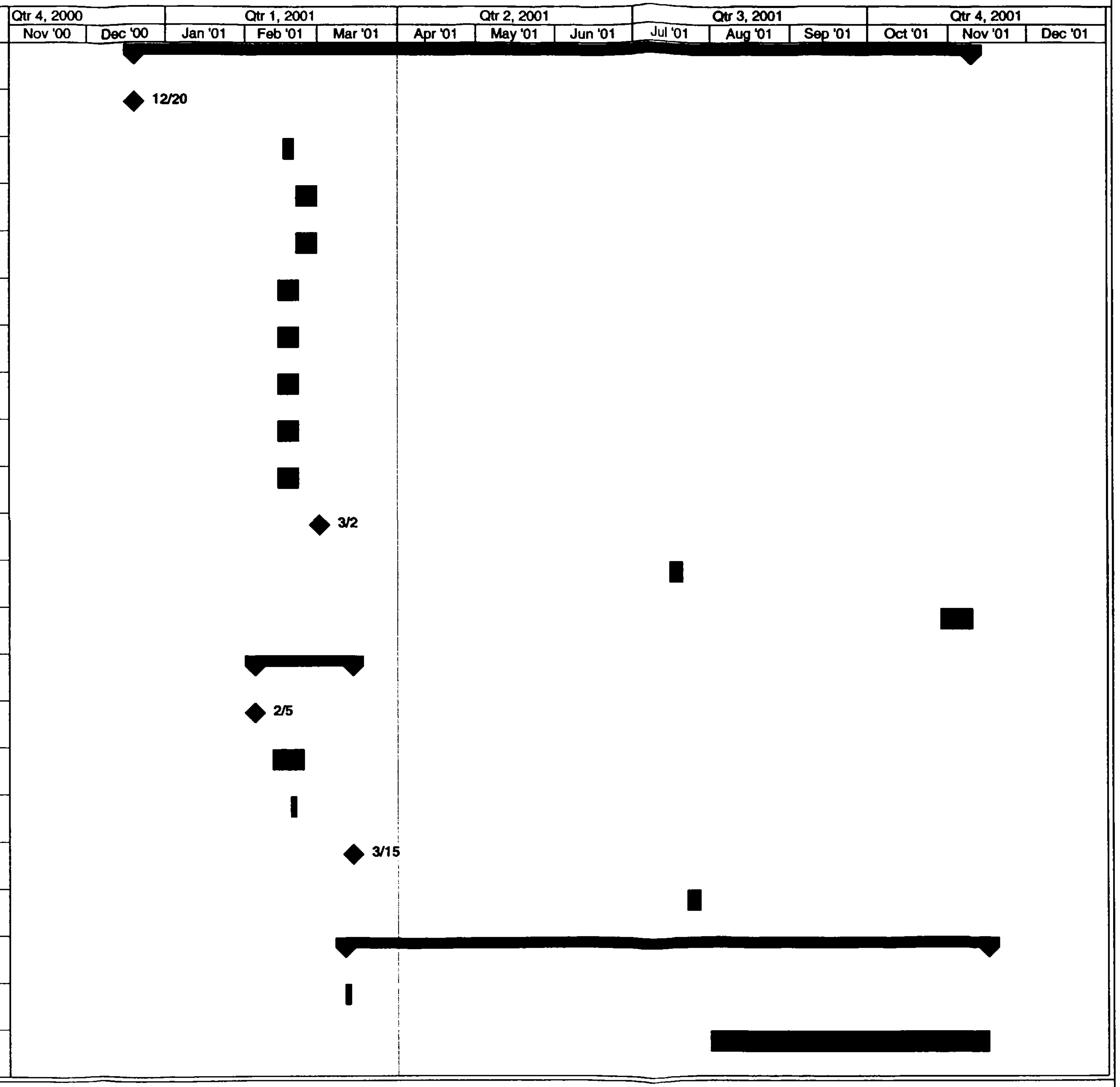
File: J:/209/0601 ACS/0106 bwes offsite/drawings/DETAILS.dgn Plot Date: 06-MAR-2003 07:04

APPENDIX A

Sequence of Construction Activities

Sequence of Construction Activities
BWES Upgrades - Off-Site Area
ACS NPL Site - Griffith, Indiana

ID	Task Name	Start	Finish	Predecessors
1	**Extraction Trenches/Wells - CDS**	**Wed 12/20/00**	**Fri 11/9/01**	
2	Mobilization	Wed 12/20/00	Wed 12/20/00	
3	EW-13A Installed	Fri 2/16/01	Mon 2/19/01	
4	EW-19 Installed	Wed 2/21/01	Wed 2/28/01	
5	EW-19A Installed	Wed 2/21/01	Wed 2/28/01	
6	EW-13A Installed	Wed 2/14/01	Wed 2/21/01	
7	EW-20 Installed	Wed 2/14/01	Wed 2/21/01	
8	EW-20A Installed	Wed 2/14/01	Wed 2/21/01	
9	EW-20B Installed	Wed 2/14/01	Wed 2/21/01	
10	EW-20C Installed	Wed 2/14/01	Wed 2/21/01	
11	Substantial Completion	Fri 3/2/01	Fri 3/2/01	
12	EW-20C Reconstruction No. 1	Mon 7/16/01	Fri 7/20/01	
13	EW-20C Reconstruction No. 2	Mon 10/29/01	Fri 11/9/01	
14	**Underground Piping Installation - KES**	**Mon 2/5/01**	**Thu 3/15/01**	
15	Mobilization	Mon 2/5/01	Mon 2/5/01	
16	Barrier Wall Penetration	Mon 2/12/01	Fri 2/23/01	
17	Rail Road Track Crossing	Mon 2/19/01	Tue 2/20/01	
18	Substantial Completion	Thu 3/15/01	Thu 3/15/01	
19	GWTP Influent Manifold Constructed - CFC	Mon 7/23/01	Fri 7/27/01	
20	**Pumps, Controls, and Instrumentation**	**Mon 3/12/01**	**Thu 11/15/01**	
21	Extraction Pumps Installed - MWH	Mon 3/12/01	Tue 3/13/01	
22	Electrical/Control Service Installed - Austgen	Wed 8/1/01	Thu 11/15/01	



Project: CCR Schedule
Date: Thu 6/20/02

Task		Progress		Summary		External Tasks	
Split		Milestone		Project Summary		External Milestone	
Deadline							

APPENDIX B

Construction Documentation Report, Groundwater Extraction System Upgrade (prepared by Hanson Engineering, January 2001)

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

Report On

Construction Documentation
Groundwater Extraction System Upgrade
Off-Site Containment Area

ACS RD/RA GROUP
AMERICAN CHEMICAL SERVICE
SUPERFUND SITE

Griffith, Indiana

Prepared for:

CONTRACT DEWATERING, INC.

Prepared By:

HANSON ENGINEERING, P.C.

Project No. 00192-011

March 19, 2001

HANSON
ENGINEERING P.C.
Soils, Foundation & Underground Specialists

March 19, 2001
Project No. 00192-011

Mr. Richard Neumann
Contract Dewatering, Inc.
5820 West Riverside Drive
P.O. Box 1
Saranac, Michigan 48881

Re: Construction Documentation Report
Groundwater Extraction System Upgrade - Off-Site Containment Area
ACS RD/RA Group
American Chemical Service Superfund Site
Griffith, Indiana

Dear Mr. Neumann:

This document represents the Construction Documentation Report for the Groundwater Extraction System Upgrade at the American Chemical Service (ACS) site in Griffith, Indiana. This report presents a summary of the construction activities related to the Groundwater Extraction System Upgrade. Also presented herein is a summary of the quality assurance monitoring performed during the extraction system upgrade construction together with "As Built" trench and well construction plans and details. A discussion of deviations from the project plans and "As Built" information is also provided.

Project Overview

The ACS site is bisected by three sets of railroad tracks, which separate the operating plant site from the area previously used for chemical waste disposal. The plant area is located north of the railroads tracks and is termed the "On Site" area. The area south of the railroad tracks is identified as the "Off Site" area. A perimeter composite barrier wall was previously constructed around the entire ACS site. The composite barrier wall consisted of a mixed in place slurry wall constructed by the deep mix trencher methods with an HDPE liner inserted into the slurry wall. A series of collector wells have been installed within the containment wall system. These wells are being pumped and discharged to an on-site treatment plant located north of the railroad tracks.

The groundwater extraction system upgrade contract included upgrading the existing groundwater extraction system by the installation of two interceptor trenches and collection wells. The purpose of the proposed extraction system upgrade is to lower the groundwater level in the "Off Site" area from the current groundwater level of approximately 634 feet to 626 feet above mean sea level. The extraction system upgrades are intended to increase the groundwater removal rates in the Off-Site Area and allow for treatment actions to begin in this area to begin in 2001.

Groundwater Extraction System Upgrade Requirements

The groundwater extraction system upgrades require the installation of Extraction Trench Nos. 19 and 20, and intermediate well 13A. The plan location of these drainage upgrades are shown on Contract Drawing No. C-2, with no date. The contract documents indicate that Extraction Trench No.19 is to be located at the southeastern portion of the site with an overall length of 150 feet. Extraction Trench No. 20 is to be located approximately 60 to 70 feet south of the southern most railroad track with an overall length of 350 feet. Intermediate Well No. 13A is to be located along the existing Extraction Trench 13. The Extraction Trenches are to consist of 6-inch diameter HDPE perforated drain tile with filter sock, end wells, intermediate wells and cleanouts. The HDPE drain tile depth was designed for an invert elevation of 620 feet at the end wells with invert elevations ranging from 621.5 to 623 feet at the intermediate well locations and sweeping up to the ground surface at the clean outs. The contract documents also require the contractor to demonstrate that the drain tile has not elongated more than 5% or as specified by the manufacturer. It is our understanding that Montgomery Watson will check to ensure the drain tile will pass a pipe pig with a minimum of 90% of the interior dimension of the collection pipe.

Extraction Trench and Intermediate Well Layout

The end well and cleanout locations for Extraction Trench Nos. 19 and 20 were laid out by Montgomery Watson with the use of a Global Positioning System unit. After approval from Montgomery Watson, the cleanout location for Extraction Trench 20 was moved north to the base of the hill located adjacent to the northern entrance drive. The cleanout location was moved to eliminate the need for a bench cut at this location, which would have required the removal of one or two large trees. Intermediate well locations were laid out by Hanson Engineering at appropriate distances from the end wells for Extraction Trench Nos. 19 and 20. Measurements were performed with a surveyors tape. Intermediate well no. 13A was laid out by Montgomery Watson and Hanson Engineering personnel. The location of the existing Extraction Trench No. 13 was determined by running a string line from the end well manhole to the cleanout. The intermediate well was then located at approximately the mid-point of the trench.

The "As Built" locations of the Extraction Trenches have been determined by Area Survey Company under subcontract with Contract Dewatering Services, Inc. The North and East coordinates for the well and cleanout locations are as follows:

Extraction Trench	Well/Cleanout No.	Grid Coordinates
Extraction Trench No. 19	EW-19	N 5904.6 E 5483.4
	EW-19A	N 5847.8 E 5432.3
	CO-19	N 5795.29 E 5376.13
Extraction Trench No. 20	EW-20	N 6507.8 E 5265.6
	EW-20A	N 6489.0 E 5346.3
	EW-20B	N 6455.1 E 5432.2
	EW-20C	N 6416.4 E 5515.7
Extraction Trench No. 13	EW-13A	N 5927.8 E 5042.8

A copy of the site plan for the project has been provided by Montgomery Watson in AutoCad format. We have superimposed the "As Built" Extraction Trenches and well locations on this plan. The revised site plan with the "As Built" information for the Extraction Trenches and the well coordinate locations are attached in Appendix A.

Extraction Trench and Well Construction Methods

The Extraction Trench alignments were prepared for construction by removing the clay cap from the trench alignment. Extraction Trench 19 also required a bench cut of 10 feet in depth to allow the trenching machine to place the drain tile at the required depth. The bench cut was 10 feet wide at the base and 30 feet wide at the top of the cut. The side slopes were required to be 1 to 1, however some sloughing of the native sands occurred, even with the excavation of 1 to 1 slopes.

The trenching machine was setup with a tile boot assembly and sand hopper to simultaneously feed the drain tile and filter sand to the bottom of the trench. The trenching machine was set up to cut an 18 inch wide trench while installing the drain tile and filter sand. The filter sand consists of an Indiana DOT coarse sand supplied by The Levy Company, St. Joseph Materials Plant. In addition, the end well screen and riser was attached to the hopper and boot assemblies. The 6-inch HDPE drain tile was attached to the end well via a 6-inch stainless steel nipple attached to the well sump. The filter sock was extended over the nipple area and held in place with black electrical tape. A copy of The Levy Company gradation range is attached in Appendix B.

Once the end well and HDPE drain tile was setup on the boot and hopper, the trencher cut into the ground to the specified elevation. The end well was then released from the boot and hopper, and the end well was backfilled with clean filter sand. Meanwhile, the trenching machine trenched away from the end well, placing the drain tile along the bottom of the excavation. Filter sand was delivered through the sand hopper to the bottom of the excavation. To prevent bridging of the filter sand, water was continuously used to wash the sand down the hopper. The excavator continued to feed the filter sand into the sand hopper on the trencher and placed sand at the top of the trencher excavation. At approximately 40 to 50 feet from the end of the run, the contractor added a 30-foot piece of solid tile to the end of the perforated section. This piece served as a clean out and was daylighted to the ground surface for access.

The pipe invert elevations at the end well and intermediate well locations were obtained with a surveyor's level and a known point on the trenchers' sand hopper, while the boom arm was perpendicular to the ground surface. To obtain these elevations, the trenching operations had to be stopped and a surveying rod held at a pre-determined spot on the sand hopper. The frequency of pipe invert elevation readings was adjusted from the Quality Control Plan of 20-foot intervals to approximately 80-foot intervals. This change was due to the presence of VOC's above action levels at the site, and the increased air monitoring needed to ensure worker safety. In addition, worker exposure time to all levels of VOC's were reduced by keeping the trenching machine moving. The 80-foot reading interval corresponds to drain tile invert elevations at the end well and intermediate well locations along the extraction trenches. A summary of the HDPE drain tile invert elevations has been prepared and is presented herewith as Appendix B.

Intermediate well installation was performed with a bucket drill rig. The bucket rig excavated a minimum 24-inch diameter hole to a depth of approximately 12 to 24 inches above the top of drain tile. Water and a short upper steel casing were used to hold the hole open. Once at depth, the intermediate well was lowered into the hole and backfilled with filter sand to approximately 3 feet below the bottom of the manhole. A minimum 2-foot thick layer of bentonite chips was placed above the filter sand to seal the intermediate wells. Manholes were set at each well location on a one-foot thick layer of gravel bedding. It should be noted spoils from the bucket rig indicated the intermediate wells were installed in the filter sand backfill above the drain tile. A copy of intermediate well and end well installation cross section views are attached in Appendix B.

QC Program for Extraction Trenches

Contract documents required the monitoring of HDPE drain tile and filter sand placement during the installation process. The drain tile feed rate was visually monitored during installation and noted to be steady during installations completed with Hanson Engineering personnel on-site. Due to the trenching machine and the drain tile feed configuration, actual field measurements of the amount of drain tile feed per 20 feet of trenching was not possible. The drain tile was fed from a spool located behind the trencher. The drain tile was then laid out alongside the trencher and up into the drain tile feed hopper. In the case of the filter sand placement, Hanson Engineering personnel visually monitored the filter sand placement during the trenching process. A constant surcharge of filter sand was supplied by the sand hopper. Once in the hopper, the sand was continuously washed down the hopper and deposited in the trench. The constant surcharge of sand ensured the material was placed throughout the trench height. In addition, the contractor placed sand at the top of the trench with the excavator to ensure the sand column over the drain tile was in conformance with the contract documents.

The filter sand for the project was purchased from The Levy Company. According to the sand delivery tickets, a total of 800 tons of sand was delivered to the site. It may also be assumed that the sand "As Delivered" had a low moisture content in the range of 5% by weight for a total dry weight of sand delivered of 762 tons. Thus the total volume of dry sand delivered is estimated to be approximately 13,854 cubic feet (513 cubic yards). It was impossible to determine the in place density of the sand after placement by the trenching machine. However, it may also be that the in trench dry density of the sand is approximately 110 pounds per cubic foot (loose conditions).

The volume of the extraction trenches has been computed based on an average depth of 27.5 feet for Extraction Trench No. 19 and for depths ranging from 14 to 16.6 feet for Extraction Trench No. 20. The total volume of trench backfill (assuming the trenches are filled to the design elevation of 3 feet below the ground surface) is 495 cubic yards. It should be noted that the upper 10 feet of Extraction Trench No. 19 was pre-excavated in order to lower the trencher. This pre-cut was backfilled with excavated material and not the filter sand. The volume of filter sand not used in Extraction Trench No. 19 due to backfilling the upper 10 feet with excavated material was approximately 90 cubic yards. In our opinion the excess sand remaining after the completion of Extraction Trench No. 19, is the result of backfilling the 10-foot pre-cut with native sands.

Construction Documentation and Photos

A senior engineer with Hanson Engineering, P.C. was on site from December 20, 2000 through December 30, 2000 for the first attempt at installing Extraction Trench No. 20. Work on the Extraction Systems Upgrade resumed on February 7, 2001 after installation of the separation barrier wall. A senior engineer with Hanson Engineering, P.C. was on site from February 7, 2001 through February 23, 2001 during the construction of the Groundwater Extraction System Upgrades. Daily field reports were prepared which documented each day activities. Daily field reports were numbered sequentially for all work performed at the site. It should be noted that daily field reports for the groundwater extraction trenches are numbered 1 through 8 and 27 through 37. Daily field reports 9 through 26 are for the separation barrier wall installation. It should be noted that Hanson Engineering personnel was not on site from February 26, 2001 through March 2, 2001 when the contractor completed the installation of Extraction Trench No. 19 and attempted the recovery of the lost drain tile end at Extraction Trench No. 20. For completeness we have included all of the daily field reports, 1 through 37 in Appendix C of this submittal.

Photographs were also taken as part of the construction documentation activities. Color copies of the photographs taken during this project are included herewith as Appendix D. We have also prepared a written Log of Photographs, which describes each photo. The Log of Photographs is also included in Appendix D.

Special Construction Issues

There were two special construction issues encountered during Extraction Trench construction. The first issue occurred when the trencher became wedged in the ground at approximately station 1+15 of Extraction Trench No. 19. The boom of the trencher was stuck in the ground for approximately 3 to 4 days. The other issue concerned the lost end of the perforated HDPE drain tile approximately 11 feet below grade at approximately station 3+20 of Extraction Trench No. 20.

When the trencher boom became struck in the ground at Extraction Trench No. 19. Concerns were raised relative to the structural integrity of the drain tile was affected by the methods used to break free the trencher chain. Once the trencher boom became wedged in the ground, the contractor tried to free the boom by digging around the boom to relieve the lateral pressures and frictional forces acting on the boom. A head of water was used to stabilize the excavation walls around the boom. When this method did not succeed in freeing the boom, the contractor used a combination of digging and attempted lifting of the boom with the Komatsu PC200LC excavator. Additional attempts included pulling the back end of the trenching machine down, with digging around and attempted lifting of the boom with an excavator. The contractor brought in a larger excavator, a Komatsu PC220LC, to use in attempts to lift the boom. After 1½ days of observing the contractor's attempts to free the trencher boom, the Hanson Engineering representative was sent back to the main office. When all previous attempts to lift and free the trencher boom failed, the contractor reportedly had a small crane delivered to the site. According to the contractor, a combination of digging around and lifting of the boom with the crane succeeded in overcoming the lateral pressures and friction that had wedged the boom. This allowed the trencher chain to spin freely around the boom. Once the chain was moving, the contractor reportedly installed the remainder of the drain tile run.

In discussion with Mr. Neumann from Contract Dewatering Services, concerning the structural integrity of the drain tile, he indicated that the chain locking up on trencher does not affect the tile in anyway. In fact, each day when you stop trenching and restart the next day, you have to dig out around the chain to start chain rotation. In this digging out operation you always work away from the tile and never excavate within 4 feet of the tile. In addition, the efforts to free the chain were centered on not allowing the boom arm to drop in elevation, as this would damage the drain tile by crushing. Since the boom arm was held firmly in place by the lateral earth pressures and all attempts at freeing the chain included an effort to slightly pick up the boom arm with the trenching machine hydraulics, an excavator and a crane, it is unlikely that the drain tile was crushed. The daily field reports from the contractor indicate that once the chain was free, the drain tile immediately started feeding and the laser level system indicated that the trencher was on grade.

During installation, the drain tile at Extraction Trench No. 20 was lost below grade when the connection between the perforated and solid tile pulled apart during trenching of the cleanout sweep. The drain tile end is located approximately 11 feet below grade and approximately 5 to 6 feet below the existing water table. The contractor attempted to expose the drain tile by open cutting the area, however the excavations never succeeded in reaching the drain tile due to caving and sloughing of the excavation near the water table. At this point, the contractor installed a well point system consisting of 13 - 2 inch diameter well points set at a depth of approximately 25 feet around the separated connection. The well points were jetted into place and connected to a pump and header system. In addition, an 8-foot high trench box was delivered on-site for use in future excavation attempts at this location. Hanson Engineering was not on-site for attempt made with the trench box and well point system. The contractor reported to us that attempts to repair the line were unsuccessful when groundwater flows from the trench backfill material could not be controlled by the well point system installed around the excavation area. It is our understanding, that current plans are for the contractor to attempt repairs in August 2001 after the Extraction Trench systems has had several months to lower the groundwater table within the "Off Site" area. It should be noted that, the contractor reported the wells located along Extraction Trench 20 are producing water.

Engineer's Statement of Compliance

To the best of my knowledge, after through investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

It is hoped that this information is sufficient to fulfill your present requirements. Should you have any questions or require additional information, please do not hesitate to call.

Respectfully submitted,
HANSON ENGINEERING, P.C.

Susan H. Bertram
Susan H. Bertram
Senior Engineer

Daniel L. Hanson
Daniel L. Hanson, P.E.
Principal Engineer

DANIEL L. HANSON
REGISTERED
No. PE60010200
STATE OF INDIANA
PROFESSIONAL ENGINEER

HANSON ENGINEERING P.

APPENDIX C

Field Records
(prepared by Hanson Engineering)

Extraction Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/22/01
WEATHER: Snow 30 F
REPORT NO: 36B
SHEET 1 OF 2

Client's representative: Mr. Richard Neumann
Contractor's representative: Mr. Richard Neumann

	Location		Depth	Ground	Bottom
	Extraction Well No.	Coordinate System	of Trench (ft.)	Surface Elev.	of Trench Elev.
Proposed	EW-13a	N 5937.6 E 5039.7	14.50	642.00	627.50
Actual		N 5927.8 E 5042.8		643.31	unk.
Proposed	EW-19	N 5912.5 E 5493.1	27.00	647.00	620.00
Actual		N 5904.6 E 5483.4	27.46	647.76	620.30
Proposed	EW-19a	N 5869.7 E 5426.1	25.50	647.00	621.50
Actual		N 5847.8 E 5432.3	26.51	648.51	622.00
Proposed	CO	N 5811.7 E 5362.9	0.00		
Actual			0.00	649.91	

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

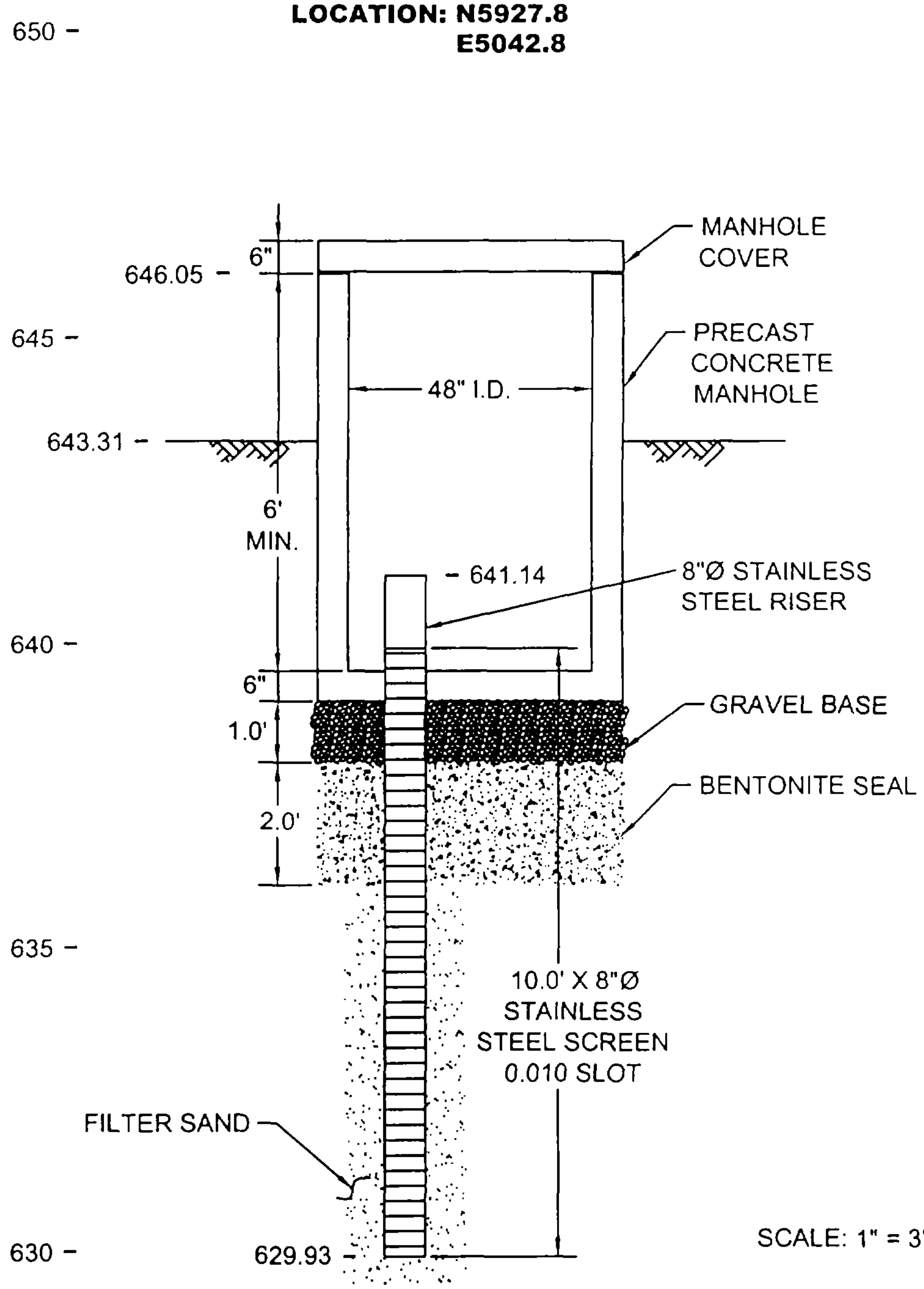
DATE: 2/12/01
WEATHER: Warm 37 F
REPORT NO: 28B
SHEET 1 OF 2

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

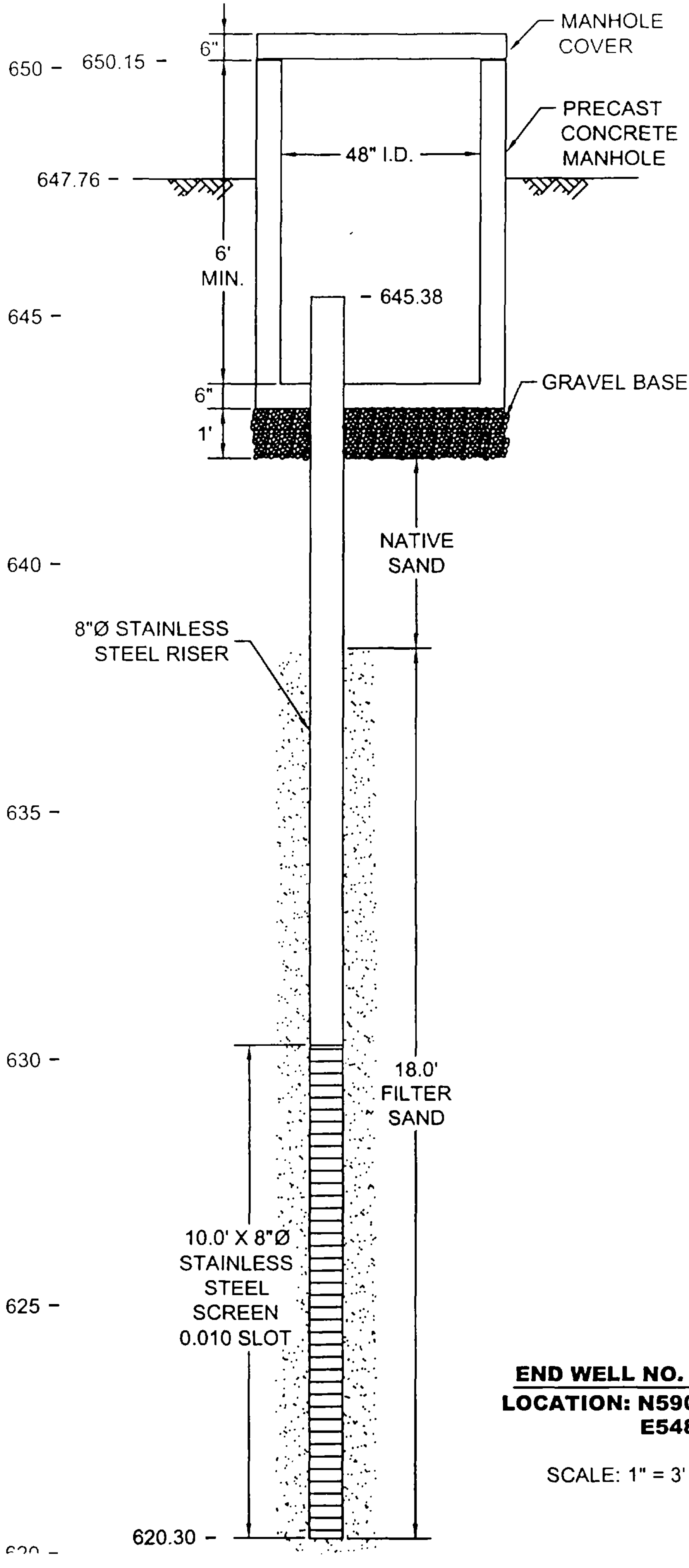
	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.
	Extraction Well No.	Coordinate System			
Proposed	EW-20	N 5256.3 E 5039.7	15.00	635.00	620.00
Actual	EW-20	N 6507.8 E 5265.6	16.62	636.60	619.98
Proposed	EW-20a	N 6471.8 E 5345.0	13.00	636.00	623.00
Actual	EW-20a	N 6489.0 E 5346.3	17.13	636.98	619.85
Proposed	EW-20b	N 6430.7 E 5434.4	13.00	636.00	623.00
Actual	EW-20b	N 6455.1 E 5432.2	14.92	637.92	623.00
Proposed	EW-20c	N 6391.9 E 5518.8	13.00	636.00	623.00
Actual	EW-20c	N 6416.4 E 5515.7	13.55	638.14	624.59
Proposed	CO	N 6355.6 E 5598.1	0.00	645.51	645.51
Actual	CO		n/a	n/a	n/a

INTERMEDIATE WELL NO. 13A

LOCATION: N5927.8
E5042.8

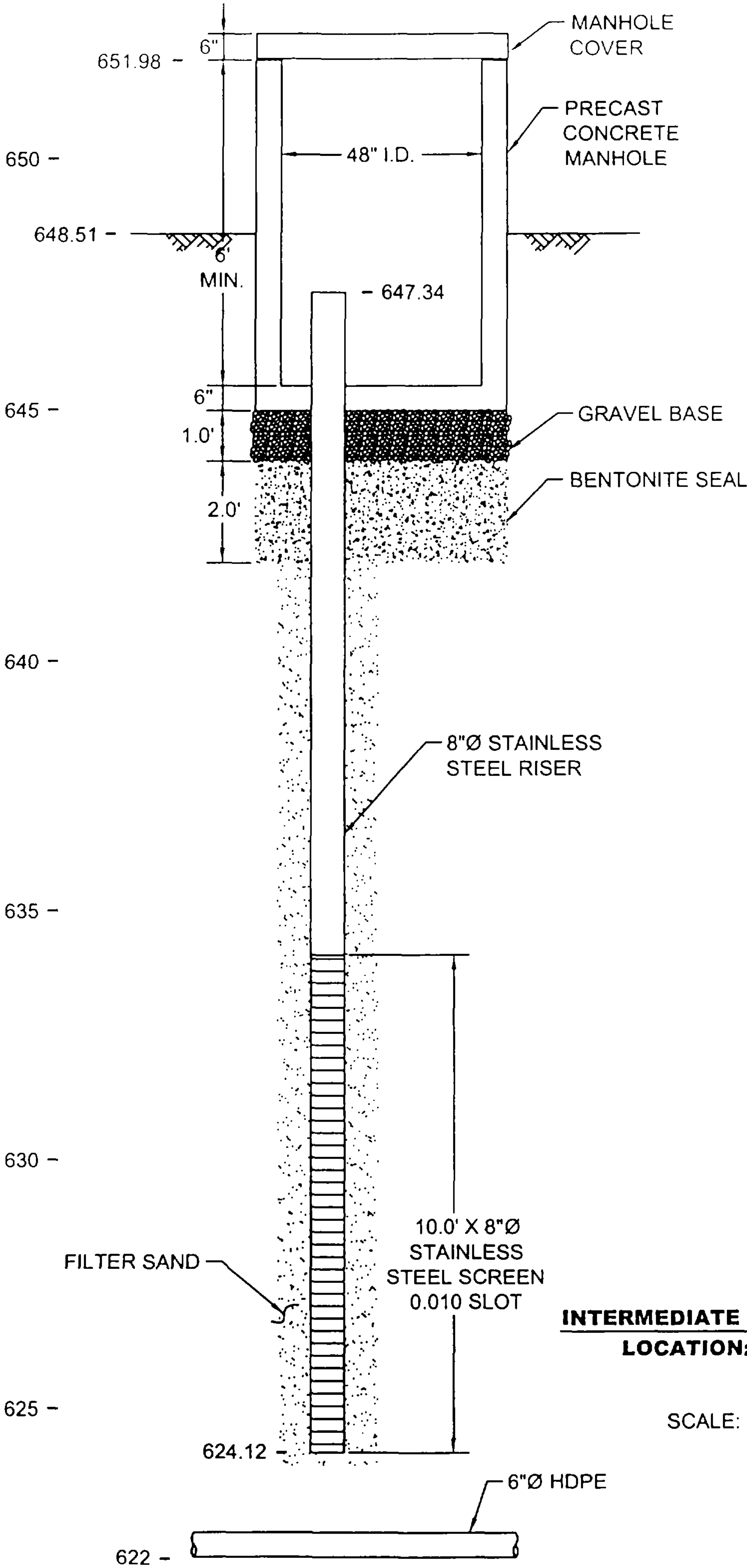


SCALE: 1" = 3'



END WELL NO. 19
LOCATION: N5904.6
E5483.4

SCALE: 1" = 3'

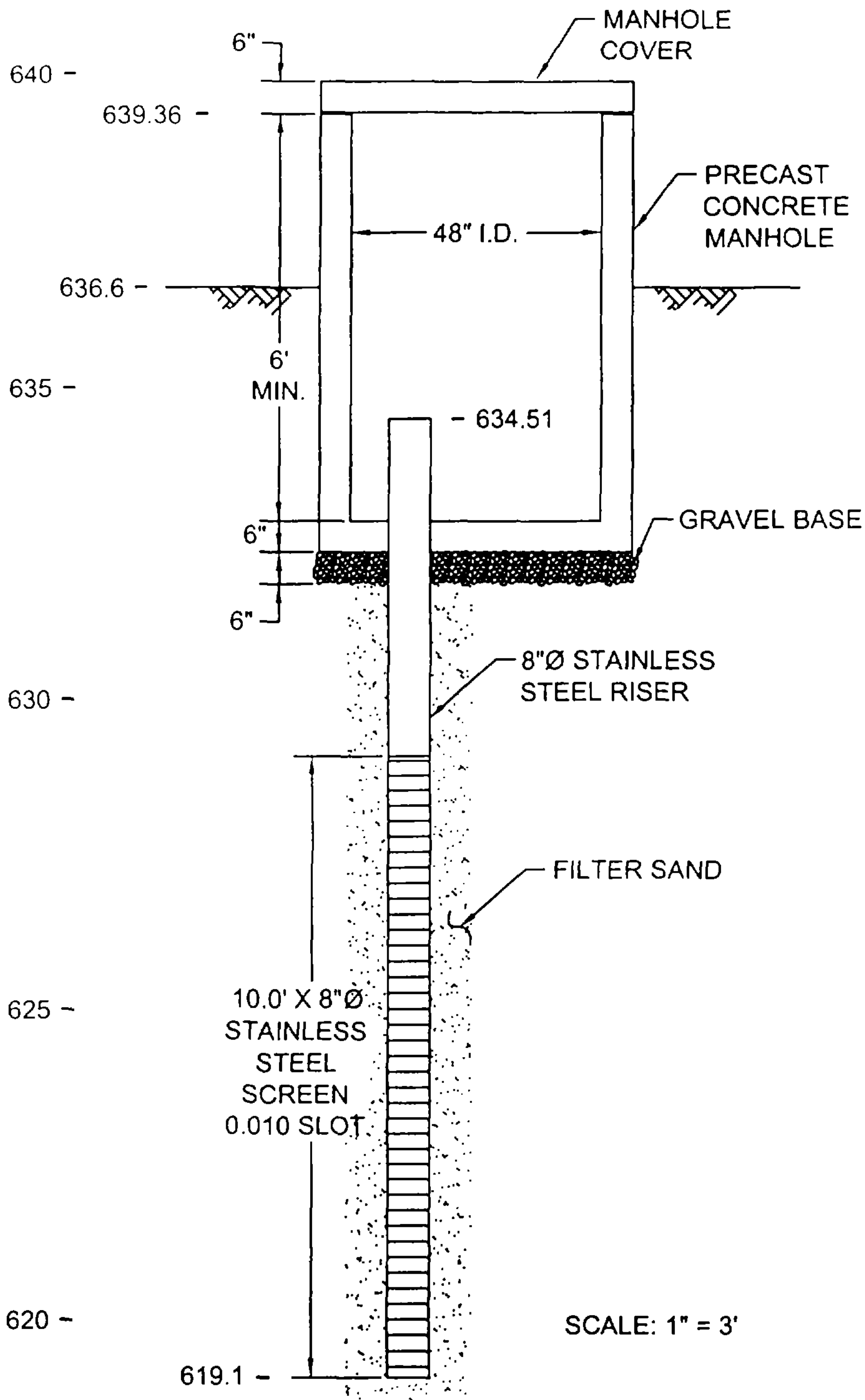


INTERMEDIATE WELL NO. 19A

LOCATION: N5847.8
E5432.3

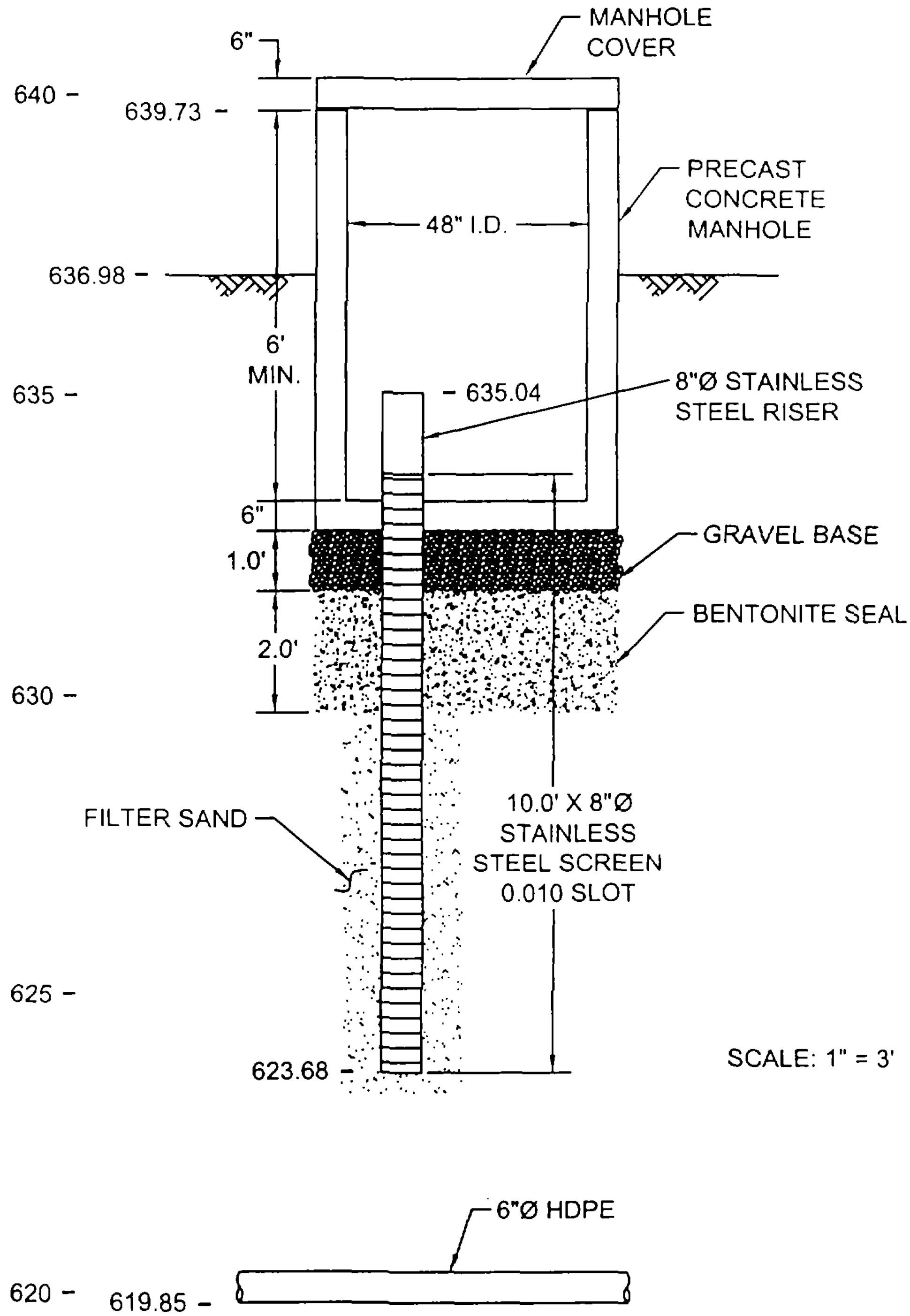
SCALE: 1" = 3'

END WELL NO. 20
LOCATION: N6507.8
E5265.6



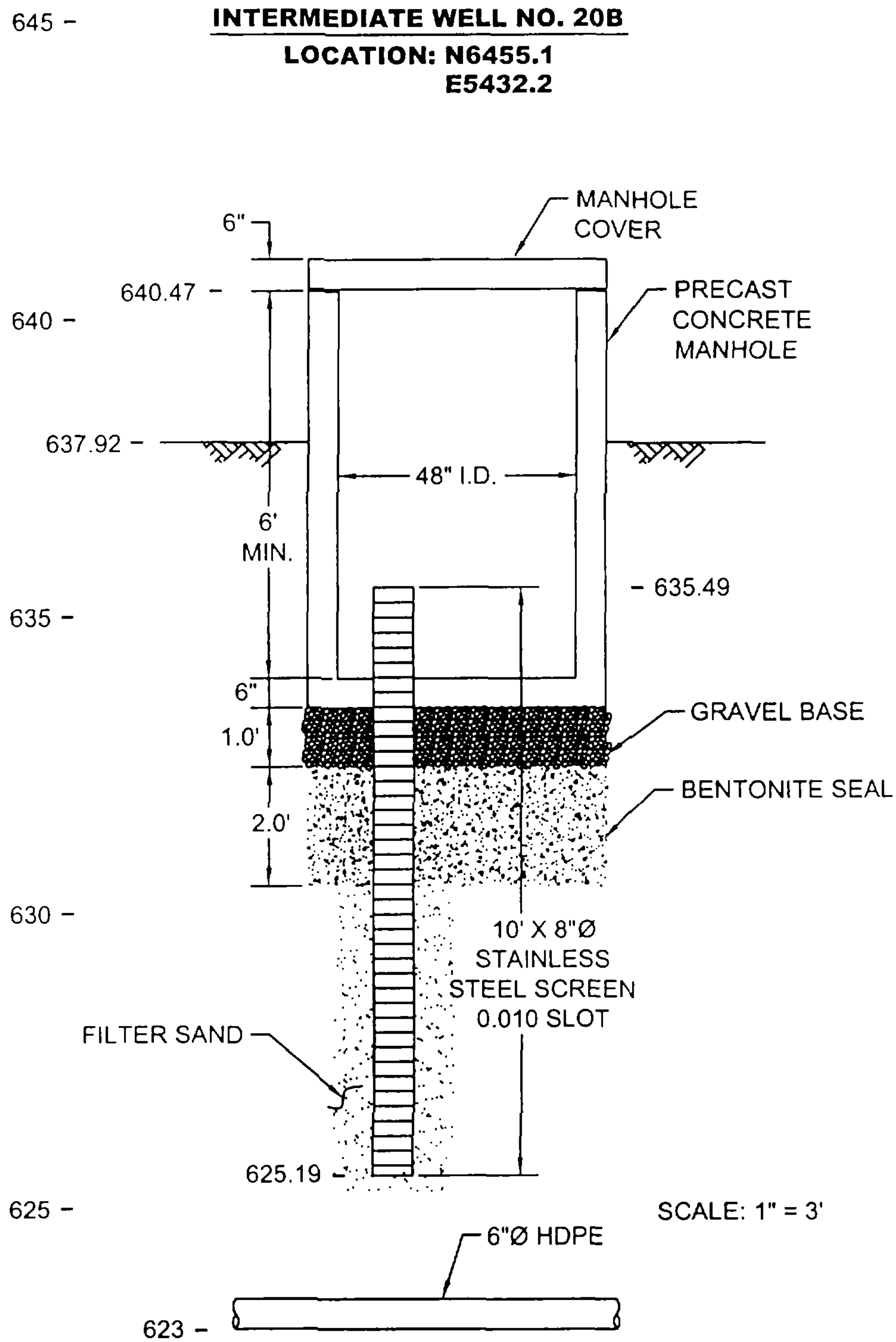
INTERMEDIATE WELL NO. 20A

LOCATION: N6489.0
E5346.3



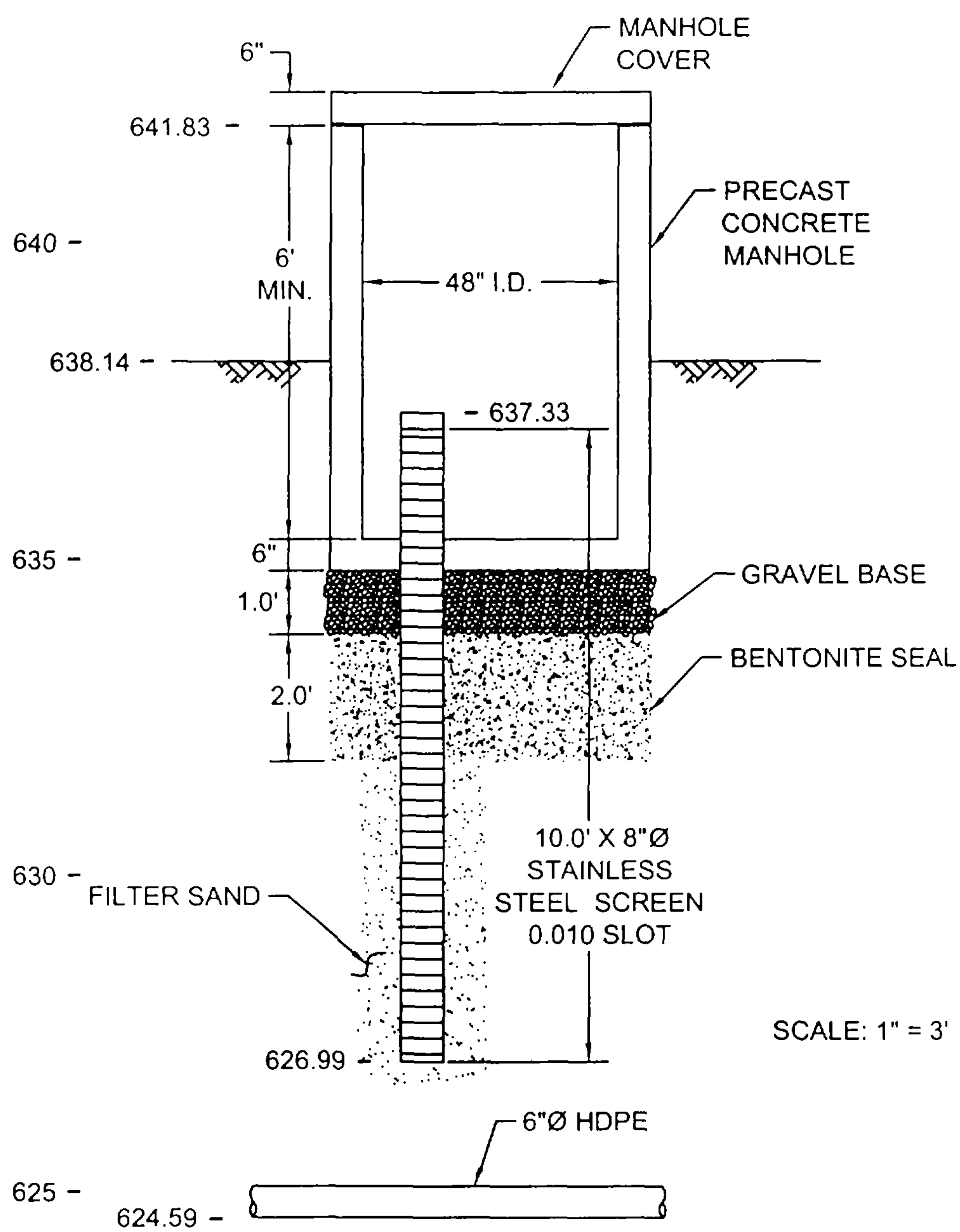
INTERMEDIATE WELL NO. 20B

LOCATION: N6455.1
E5432.2



INTERMEDIATE WELL NO. 20C

LOCATION: N6416.4
E5515.7



SCALE: 1" = 3'

APPENDIX D

Daily Field Reports
(prepared by Hanson Engineering)

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: March 02, 2001

CLIENT: Contract Dewatering Services

WEATHER: Clear

CONTRACTOR(S): Contract Dewatering Services

SHEET 1 OF 2

REPORT NO.: 42

CLIENT'S REPRESENTATIVE(S): Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Richard Neumann

PROGRESS OF WORK:

Did balance of clean up and de-mobilized to CDS, Inc. shop.

FIELD REPRESENTATIVE:

REVIEWED BY:

Richard Neumann

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

LOCATION: Griffith, Indiana

CLIENT: Contract Dewatering Services

CONTRACTOR(S): Contract Dewatering Services

PROJECT NO.: 00192-011

DATE: March 1, 2001

WEATHER: Clear

SHEET 1 OF 2

REPORT NO.: 41

CLIENT'S REPRESENTATIVE(S): Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Richard Neumann

PROGRESS OF WORK:

No intrusive work was done today. We cleaned up and loaded our job trailers. Getting ready to de-mobilize.

FIELD REPRESENTATIVE:

Richard Neumann

REVIEWED BY:

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: April 28,2(
WEATHER: Clear
REPORT NO: 40
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm) G.S.	5 ft.	10 ft.	Remarks
	7:30				
Well 19-A	8:00	0			
	8:30				
	9:00				
Well 19-A	9:30	0.2 PPM			
	10:00				
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

LOCATION: Griffith, Indiana

CLIENT: Contract Dewatering Services

CONTRACTOR(S): Contract Dewatering Services

PROJECT NO.: 00192-011

DATE: April 28, 2001

WEATHER: Clear

SHEET 1 OF 2

REPORT NO.: 40

CLIENT'S REPRESENTATIVE(S): Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Richard Neumann

PROGRESS OF WORK:

We started the installation of intermediate well 19-A at 8:00 a.m., by 10:00 we had reached the clay and the desired bottom elevation. The soil was very coarse and clean. This should be the best well. Again the H-NU readings were taken and all readings were almost non-detect.

After we folded the rig up we decontaminated it with clean water from our tanker. At the same time we decontaminated the trencher and parked it on the south drive, ready for loading onto our lowboy.

In the afternoon we excavated for the man holes at well 19 and 19-A and installed them. Grout was placed around the well casing and the covers were left off for further work.

FIELD REPRESENTATIVE:

REVIEWED BY:

Richard Neumann

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: April 27,200
WEATHER: Clear
REPORT NO: 39
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
Clean out	10:00	0.3 PPM			
	10:30				
Clean out	11:00	.02 PPM			
	11:30				
	12:00				
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: April 27, 2001

CLIENT: Contract Dewatering Services
WEATHER: Clear

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 39

CLIENT'S REPRESENTATIVE(S): Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Richard Neumann

PROGRESS OF WORK:

Mobile crane arrived at 7:30 as planned and began to setup. Once the mobile crane was set up we connected his lifting cable to the trencher boom. This would help relieve the boom weight off the chain to assist in getting the chain free.

Once we relieved the boom weight, we again excavated down the backside of the boom. This is the chain side and is 4 to 5 feet away from the tile, so no contact was made with the tile. After we dug out a little deeper by the chain I had the trencher operator work the chain back and forth until it freed. Once the chain began spinning we checked our laser and we were right on grade. The trencher boom had not settled at all. I took a reading with our H-NU meter and had a very low reading.

We then advanced the trencher and the tile freed immediately. We advanced 10 feet. This is where the clean out had to be attached. We connecte the clean out. We then began our boom removal and slowly advanced the clean out to the ground surface. The trench was completed by 11:30 a.m.

In the afternoon we backfilled the sub cut area and made a platform to install intermediate well No. 19-A.

FIELD REPRESENTATIVE: Richard Neumann

REVIEWED BY:

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: April 26, 20
WEATHER: Clear
REPORT NO: 38
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
	10:00				
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
Clean out 19	13:00	.4 PPM			
	13:30				
	14:00				
Clean out 19	14:30	.1 PPM			
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

LOCATION: Griffith, Indiana

CLIENT: Contract Dewatering Services

CONTRACTOR(S): Contract Dewatering Services

PROJECT NO.: 00192-011

DATE: April 26, 2001

WEATHER: Clear

SHEET 1 OF 2

REPORT NO.: 38

CLIENT'S REPRESENTATIVE(S): Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Richard Neumann

PROGRESS OF WORK:

I arrived on site approximately 10:30 central standard time to evaluate the trencher and determine what it would tak to get the chain freed up. I made a decision to try to free the chain with the equipment we had on site. We filled our tanker with clean water from the hydrant and flooded the hole around the trencher boom. We began to excavate down on the chain side of the boom to dislodge the chain. We began air monitoring with a H-NU meter and all readings in the intrusion after were below the 1 PPM limit.

We dug as deep as we could with our excavator but we could not free up the chain. I decided to bring in a large mobile crane to help hold some weight off the boom. The crane will be here at 7:30 Tuesday morning.

FIELD REPRESENTATIVE:

REVIEWED BY:

Richard Neumann

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 37

PROJECT NO.: 00192-011 | DATE: 02/23/00 | SHEET 2 OF2

PROGRESS OF WORK:

and stockpile were informed of the hazard and opted to wear the full face respirator. Beyond 20 feet downwind, the contamination was below the action level of 1 ppm.

The contractor spent the day trying to get the trencher chain spinning. Attempts were made to dig it free and pull/ lift the boom arm higher. Spoils from digging along the chain below the water table revealed the presence of a black, coarse sand with some gravel. The coarse sand layer appears to be a minimum of 1 to 2 feet in thickness and located at the water table. The layer may be thicker, however under current conditions I am unable to verify.

The contractor used 20,000 gallons of clean water to keep a head of water above the water table within the excavation. This was to help prevent cave-in of the excavation sides. However, the excavation sides did cave in, widening the excavation by approximately 2 feet on the east side and 1 to 1.5 feet on the west side.

Due to the time required to fill the water truck (approximately 90 minutes), the contractor set up a pump at EW-19. The pump should draw ground water from the immediate area and supply enough water to keep ahead of water in the excavation. It should be noted that EW-19 is attached to the drain tile with approximately 115 linear feet of drain tile between the extraction well and the trencher boom arm.

Work will resume on Monday, February 26 at 7:30 AM. I will not be needed on-site until the trencher boom arm is free.

FIELD REPRESENTATIVE: SHB | REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 02/23/01

CLIENT: Contract Dewatering Services
WEATHER: Sunny 30 F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 37

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 19.6 ppm (instantaneous reading) or PID less than or equal to 1.2 ppm (one minute average reading). Due to the time required (20 minutes for Benzene) to perform detector tube sampling and the short term nature of the contamination no detector tube sampling was performed. An area of contamination was encountered for a distance of approximately 10 feet at station 1+50 on Interceptor Trench 19. The area of contamination consisted of a large quantity of old barrel/ drum lids with occasional dried paint in blue, orange, and yellow. The client was informed of the contamination and occasional VOC readings above 1 ppm. Personnel working downwind and within 20 feet of the excavation

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	2/22/01
PROJECT NO.:	**00192-011**	WEATHER:	Snow 30 F
LOCATION:	**Griffith, Indiana**	REPORT NO:	36B
CLIENT:	Contract Dewatering Services	SHEET 1 OF	2
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Mr. Richard Neumann
Contractor's representative: Mr. Richard Neumann

	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.
	Extraction Well No.	Coordinate System			
Proposed	EW-13a	N 5937.6 E 5039.7	14.50	642.00	627.50
Actual		N 5927.8 E 5042.8		643.31	unk.
Proposed	EW-19	N 5912.5 E 5493.1	27.00	647.00	620.00
Actual		N 5904.6 E 5483.4	27.46	647.76	620.30
Proposed	EW-19a	N 5869.7 E 5426.1	25.50	647.00	621.50
Actual		N 5847.8 E 5432.3	26.51	648.51	622.00
Proposed	CO	N 5811.7 E 5362.9	0.00		
Actual			0.00	649.91	

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/22/01
WEATHER: Snow 30 F
REPORT NO: 36A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
EW-19	7:30				
Background	8:00	0	0	0	
Readings	8:30	0	0	0	
	9:00	0	0	0	
	9:30	0	0	0	
	10:00	0	0	0	
	10:30	0	0	0	
Lunch	11:00				
Lunch	11:30				
EW-19 STA 0+00	12:00	0.9	0.9	0.9	
STA 0+10	12:30	0.5	0.4	0.4	
STA 0+50	13:00	0.2	0.2	0	
STA 1+15	13:30	0	0	0	Chain stuck in ground.
STA 1+15	14:00	0	0	0	Trying to get chain
STA 1+15	14:30	0	0	0	rotating again.
STA 1+15	15:00	0	0	0	"
STA 1+15	15:30	0	0	0	"
STA 1+15	16:00	0	0	0	"
STA 1+15	16:30	0	0	0	"
	17:00				
	17:30				

XI. REGULATORY INFORMATION

STATUS ON SUBSTANCE LISTS

Comprehensive Environmental Response, Compensation and Liability Act of 1980, (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4.

Components present in this product which may require notification are:

Chemical	**CAS Number**
NONE	

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on RQs.
Components present in this product at a level which could require reporting under the statute are:

NONE

SARA requires the submission of annual reports of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDS that are copied and distributed for this material.
Components present in this product at a level which could require reporting under the statute are:

NONE

Toxic Substances Control Act (TSCA)
The ingredients of this product are on the TSCA inventory.

XII. STATE RIGHT TO KNOW

THIS PRODUCT CONTAINS (A) CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

IX. SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

AVOID SKIN AND EYE CONTACT. IF SPILLED MAY CAUSE SLIPPERY FLOOR CONDITIONS.

OTHER HANDLING AND STORAGE REQUIREMENTS

TO AVOID PRODUCT DEGRADATION AND EQUIPMENT CORROSION, DO NOT USE IRON, COPPER OR ALUMINUM CONTAINERS OR EQUIPMENT.

X. DEPARTMENT OF TRANSPORTATION INFORMATION

PROPER SHIPPING NAME :
NOT REGULATED AS HAZARDOUS

HAZARD CLASS :
NOT APPLICABLE

HAZARDOUS SUBSTANCE :
NOT APPLICABLE

LABEL :
NOT APPLICABLE

PLACARDS :
NONE

REPORTABLE QUANTITY :
NA

ID NUMBER :
NOT APPLICABLE

VI. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

NONE

INCOMPATIBILITY

STRONG OXIDIZERS. MATERIAL REACTS SLOWLY WITH IRON, COPPER & ALUMINUM

HAZARDOUS DECOMPOSITION PRODUCTS

THERMAL DECOMP. MAY PRODUCE CARBON MONOXIDE, AMMONIA & OXIDES OF NITROGEN

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

WILL NOT OCCUR

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

CONTAIN SPILL WITH ABSORBENT MATERIAL. PLACE IN CONTAINER FOR DISPOSAL. FINAL CLEANUP WITH WATER UNTIL SLIPPERY CONDITION IS ELIMINATED.

NEUTRALIZING CHEMICALS

NONE ARE REQUIRED

WASTE DISPOSAL METHOD

DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION REQUIREMENTS

WHERE THIS MATERIAL IS NOT USED IN A CLOSED SYSTEM, GOOD ENCLOSURE AND LOCAL EXHAUST VENTILATION SHOULD BE PROVIDED TO CONTROL EXPOSURE.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY

WHERE EXPOSURE IS BELOW PEL, NO RESPIRATORY PROTECTION REQUIRED.

EYE

CHEMICAL SPLASH PROOF GOGGLES.

GLOVES

CHEMICAL RESISTANT GLOVES

OTHER CLOTHING AND EQUIPMENT

APRON, LONG SLEEVE SHIRT

IV. FIRE AND EXPLOSION DATA

FLASH POINT: >200 DEG. F (PENSKY-MARTENS)
FIRE EXTINGUISHING MEDIA: USE WATER SPRAY, CARBON DIOXIDE OR DRY CHEMICAL TO EXTINGUISH FIRES. USE WATER TO KEEP CONTAINERS COOL
SPECIAL FIRE FIGHTING PROCEDURES: WEAR SELF CONTAINED, POSITIVE PRESSURE BREATHING APPARATUS AND FULL FIRE-FIGHTING PROTECTIVE CLOTHING. UNUSUAL FIRE AND EXPLOSION HAZARD: NONE STATED

V. HEALTH HAZARD INFORMATION

CARCINOGENICITY - NOT ON NTP, IARC OR OSHA LISTS

ACUTE ORAL LD50	*ACUTE DERMAL LD50*	*AQUATIC TOXICITY LC50*
ND	ND	ND

ROUTES OF EXPOSURE AND EFFECTS

EYE: MAY CAUSE IRRITATION.
SKIN: CAUSES SKIN IRRITATION.
INGESTION: INGESTION OF LARGE AMOUNTS MAY CAUSE INJURY.
INHALATION: PROLONGED REPEATED EXPOSURE TO VAPOR MAY CAUSE CENTRAL NERVOUS SYSTEM DAMAGE AS WELL AS HEART AND BLOOD DISORDERS. ASPIRATION MAY CAUSE CHEMICAL PNEUMONITIS. OVEREXPOSURE TO VAPOR MAY CAUSE DIZZINESS, DROWSINESS, HEADACHE, AND NAUSEA.

EMERGENCY AND FIRST AID PROCEDURES

EYES: IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.
SKIN: WASH WITH SOAP AND WATER AFTER USE. LAUNDER CLOTHING BEFORE REUSE.
INHALATION: REMOVE TO FRESH AIR IF AFFECTED. CONSULT A PHYSICIAN.

Baroid Environmental, Safety and Transportation Data Sheet

FIRE 1
HEALTH 2
REACTIVITY 0
SP. HAZARD

EZ MUD®

I. PRODUCT IDENTIFICATION

SUPPLIER BAROID DRILLING FLUIDS, INC.	**REGULAR TELEPHONE NUMBER** 281/871-5900 **EMERGENCY TELEPHONE NO.** 800 424-9300
ADDRESS P.O. BOX 1675 HOUSTON, TEXAS 77251	Baroid Division of Dresser Industries, Inc.
TRADE NAME EZ MUD	
GENERIC DESCRIPTION PARTIALLY HYDROLYZED POLYACRYLAMIDE	

II. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	HAZARD DATA
PETROLEUM DISTILLATE HYDRO-	24	400 PPM OSHA
TREATED LIGHT 64742-47-8		

III. PHYSICAL DATA

BOILING POINT (Deg F) >200 F	MELTING POINT NA	FREEZING POINT ND
SPECIFIC GRAVITY ($H2O$ = 1) 1.0	VAPOR PRESSURE (mm Hg) NA	
VAPOR DENSITY (AIR = 1) NA	SOLUBILITY IN WATER, % BY WT. APPRECIABL	
% VOLATILES BY VOLUME 70	EVAPORATION RATE(BUTYL ACETATE = 1) <1	
APPEARANCE AND ODOR CREAM COLORED LIQUID, SLIGHT ODOR	DENSITY @ 20 Deg C (Uncompacted) 8.3 lb/gal	
pH NA		

NA = Not Applicable ND = Not Determined

All information recommendations and suggestions herein concerning our product are based on tests and data believed to be reliable, however, it is the user's responsibility to determine the safety, toxicity, and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied, is made by Baroid Corporation as to the effects of such use, the results to be obtained, or the safety and toxicity of the product nor does Baroid Corporation assume any liability arising from the use, by others, of the product referred to herein. Nor is the information herein to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

Baroid Drilling Fluids, Inc.
P.O. Box 1675, Houston, Texas 77251

Baroid Division of Dresser Industries, Inc.

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 36

PROJECT NO.: 00192-011 DATE: 02/22/00 SHEET 2 OF2

PROGRESS OF WORK:

chain. At 4:30 PM the chain was still stuck. The contractor will resume efforts to free the boom and chain tomorrow. The contractor backfilled approximately 100 linear feet of the trench and pre-cut while trying to free the trencher chain.

Work will resume at 7:30 AM tomorrow.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/22/01
CLIENT: Contract Dewatering Services
WEATHER: Snow 30 F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 36

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann
CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0.9 ppm (instantaneous reading) and 0.7 ppm (one minute average reading). All work was performed in Level D PPE.

The contractor finished setting up the trenching machine and began trenching interceptor trench 19 at 12:20 PM. Approximately 115 linear feet of trench was installed when the water truck ran out of water and the chain got stuck in the sand. The fact that the trencher was tracking up the ramp (out of the pre-cut) also reduced power to the chain, according to the operator. The contractor tried lubricating the chain with EZ-Mud polymer drilling fluid and digging the sand away from the upper portion of the boom, hopper, and

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/21/01
WEATHER: Sunny, Cold 15F
REPORT NO: 35A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
MH EW-20	8:00	0	0	0	
MH EW-20	8:30	0	0	0	
MH EW-20	9:00	0	0	0	
MH EW-20	9:30	0	0	0	
MH EW-20A	10:00	0	0	0	
MH EW-20A	10:30	2.2	0.8	0	
MH EW-20C	11:00	0	0	0	
MH EW-20B	11:30	0	0	0	
Lunch	12:00				
Lunch	12:30				
EW-19	13:00	0	0	0	
EW-19	13:30	0	0	0	
EW-19	14:00	0	0	0	
EW-19	14:30	0	0	0	
EW-19	15:00	0	0	0	
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 35

PROJECT NO.: 00192-011 | DATE: 02/21/00 | SHEET 2 OF2

PROGRESS OF WORK:

In addition, the contractor removed the frost layer in preparation for excavating the tail end of the drain tile at station 3+20, interceptor trench 20.

The contractor spent the afternoon working on the trenching machine. New cutters were installed on the chain and the end well EW-19 was attached to the hopper on the boom arm of the machine.

Work will resume at 7:30 AM tomorrow.

FIELD REPRESENTATIVE: SHB | REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 02/21/01

CLIENT: Contract Dewatering Services

WEATHER: Sunny, Cold 15 F

CONTRACTOR(S): Contract Dewatering Services

SHEET 1 OF 2

REPORT NO.: 35

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during confined space work in man holes. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 2.2 ppm (instantaneous reading) and 0.2 ppm (one minute average reading). The air was checked prior to entering the manholes and during work in manholes.

The contractor pumped water from manholes at EW-20, EW-20A, and EW-20B. Once the water was removed, the opening around the well casing was filled with concrete along with the lift points of the manhole sections. A quickly dissipating VOC reading of 2.2 ppm was obtained in manhole EW-20A when breaking the ice layer near the bottom of the manhole.

FIELD REPRESENTATIVE: SHB

REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/20/01
WEATHER: Sunny 32 F
REPORT NO: 34A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm) G.S.	5 ft.	10 ft.	Remarks
	7:30				
EW-20B	8:00	9.6	0	0	
EW-20B	8:30	4.2	0	0	
EW-20A	9:00	3.1	0	0	
EW-20A	9:30	6.4	0	0	
EW-20	10:00	0	0	0	
EW-20	10:30	0	0	0	
EW-19 STA 1+20	11:00	0	0	0	
EW-19 STA 1+25	11:30	0	0	0	
Lunch	12:00				
Lunch	12:30				
EW-19 STA 1+30	13:00	0	0	0	
EW-20 STA 3+20	13:30	0	0	0	
EW-20 STA 3+30	14:00	0	0	0	
EW-20 STA 3+35	14:30	0	0	0	
EW-20 STA 3+25	15:00	0	0	0	
EW-19 STA 1+50	15:30	0	0	0	
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 34

PROJECT NO.: 00192-011 | DATE: 02/20/00 | SHEET 2 OF2

PROGRESS OF WORK:

at approximately station 3+20 of interceptor trench 20. A total of 13- 2 inch diameter well points were installed.

The contractor finished the 10 foot pre-cut at interceptor trench 19. From station 1+10 to 1+50, trash and debris consisting of washing machines, hot water heater, refrigerator, sofa, carpet, barrel lids, and occasional barrel pieces were encountered on top of the native sand, under the clay cap. No VOC contamination was detected within the debris.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 02/20/01

CLIENT: Contract Dewatering Services
WEATHER: Sunny 32 F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 34

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during drilling operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 9.6 ppm (instantaneous reading) or 4.2 ppm (one minute average reading). Due to the sampling time required and intermittent nature of the VOC's, not detector tube sampling was performed.

The contractor continued setting manholes along interceptor trench 20. Manholes were set EW-20, EW-20A, and EW-20B. The presence of contaminated groundwater at EW-20A and EW-20B necessitated an worker in the excavation use Level C PPE.

Well points were set on 3 sides of the proposed excavation for the end of the drain tile

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/19/01
WEATHER: Sunny, Windy 40 F
REPORT NO: 33A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
Interceptor	7:30				
EW-19	8:00	0	0	0	
STA 0+20	8:30	0	0	0	
STA 0+30	9:00	0	0	0	
STA 0+40	9:30	0	0	0	
STA 0+40	10:00	0	0	0	
STA 0+45	10:30	0	0	0	
STA 0+50	11:00	0	0	0	
STA 0+50	11:30	0	0	0	
Lunch	12:00				
Lunch	12:30				
EW-13A	13:00	6.1	3.9	3.9	No dragger dector
EW-13A	13:30	4.2	1.6	1.6	tubes sampled due to
EW-13A	14:00	8.8	3.1	3.1	intermitant high reading
EW-20C	14:30	1.2	0.4	0	with 0 ppm generally
EW-20C	15:00	3.2	0	0	encountered.
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 33

PROJECT NO.: 00192-011 DATE: 02/19/00 SHEET 2 OF2

PROGRESS OF WORK:

sand to approximately 9.5 feet. Below this depth, a clean medium to coarse sand was encountered to the excavated depth of approximately 10 feet.

Manholes EW-13A and EW-20C were set over the extraction wells at these locations. EW-13A was set in Level C PPE (all personnel in area) and EW-20C was set in level C for workers actually working in the excavation.

The contractor received shipment of approximately 50 cyds of sand fill and 25 cyds of stone.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 02/19/01

CLIENT: Contract Dewatering Services

WEATHER: Sunny, Windy 40 F

CONTRACTOR(S): Contract Dewatering Services

SHEET 1 OF 2

REPORT NO.: 33

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during drilling operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 11 ppm (instantaneous reading) and ranged from 0 to 9 ppm (one minute average reading) at manholes EW-13a and EW-20c. No VOC's were detected during pre-cutting at interceptor trench EW-19. It should be noted that approximately 5 crushed barrels were encountered between the clay cap and native sands along the interceptor trench alignment. PID readings were negative for VOC's on the crushed barrel parts.

The contractor continued pre-cutting the sub-grade along a the interceptor trench EW-19. Approximately 80 linear feet of the 150 linear feet interceptor trench has been pre-cut. The soils consist of approximately 12 to 18 inches of clay fill underlain by native silty fine

FIELD REPRESENTATIVE: SHB

REVIEWED BY: [signature]

Separation Barrier Wall

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/16/01
WEATHER: Cloudy 30 F
REPORT NO: 32A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.	
	Extraction Well No.	Coordinate System				
Proposed	EW-13a	N 5937.6 E 5039.7	14.50	642.00	627.50	
Actual			15.81	643.31	627.50	*Assumed based on MW drawing
Proposed	EW-19	N 5912.5 E 5493.1	27.00	647.00	620.00	
Actual				647.76		
Proposed	EW-19a	N 5869.7 E 5426.1	25.50	647.00	621.50	
Actual				648.51		
Proposed	CO	N 5811.7 E 5362.9	0.00			
Actual				649.91		

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/16/01
WEATHER: Cloudy 30 F
REPORT NO: 32A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
Background	7:30	0	0	0	
at EW-19	8:00	0	0	0	
"	8:30	0	0	0	
"	9:00	0	0	0	
EW-13A	9:30	0	0	0	
EW-13A	10:00	0	0	0	
EW-13A	10:30	0.6	0.6	0.4	
EW-13A	11:00	4.8	4.8	3.2	
EW-13A	11:30	7.1	7.1	6.3	
EW-13A	12:00	4.9	4.9	4.0	
EW-13A	12:30	2.0	2.0	1.7	
Lunch	13:00				
EW-20B	13:30	0	0	0	
EW-20B	14:00	0	0	0	
EW-20A	14:30	0	0	0	
EW-20A	15:00	0	0	0	
EW-20A	15:30	0	0	0	
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 32

PROJECT NO.: 00192-011 DATE: 02/16/00 SHEET 2 OF2

PROGRESS OF WORK:

with a screen opening size of 0.010 inches. A clean, coarse sand fill was placed as a filter material to 1.5 feet above the top of screen and then a 2.5 foot bentonite seal was installed.

The contractor received shipment of the remaining sand fill for interceptor trench, EW-19. Approximately 150 cyds of sand arrived today, bringing the total sand delivered for EW-19 to approximately 300 cyds.

The contractor spent the afternoon dewatering 9standing water) along interceptor trench EW-20 and replacing the clay cap from approximately STA 1+40 to STA 2+80. Additionally, the contractor began the bench cut at interceptor trench EW-19. Approximately 30 linear feet of the alignment was cut and benched to a maximum depth of 8.5 feet.

Work will resume Monday morning at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/16/01
CLIENT: Contract Dewatering Services
WEATHER: Cloudy 30 F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 32

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann
CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during drilling operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 80 ppm (instantaneous reading) and ranged from 0 to 7.1 ppm (one minute average reading).

The contractor installed extraction well EW-13A at the midpoint of interceptor trench EW-13. Based on ground surface elevation and assumed existing drain tile invert elevation (from Montgomery Watson drawing), the drain tile invert is approximately 15.5 feet below ground surface. The contractor excavated a 30 inch diameter hole with a Gus Pech bucket rig. EW-13A was set at an approximate depth of 13.5 feet below grade. The extraction well was constructed of 8 inch diameter stainless steel screen and riser. The screen is 10 feet long

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FIELD REPRESENTATIVE: SHB
REVIEWED BY: [signature]

Separation Barrier Wall

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/15/01
WEATHER: Cloudy 32 F
REPORT NO: 31A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
EW-20B	8:30	0	0	0	
EW-20B	9:00	0	0	0	
EW-20B	9:30	0.8	0.8	0.8	
EW-20B	10:00	0.2	0.2	0	
EW-20B	10:30	0.2	0.2	0	
EW-20C	11:00	0	0	0	
EW-20C	11:30	0.2	0.2	0	
Lunch	12:00				
Lunch	12:30				
EW-20C	13:00	0.6	0.6	0.6	
EW-20C	13:30	14.0	14.0	10.0	
EW-20C	14:00	0	0	0	
EW-20C	14:30	0	0	0	
EW-20C	15:00	0	0	0	
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 31

PROJECT NO.: 00192-011 | DATE: 02/15/00 | SHEET 2 OF2

PROGRESS OF WORK:

The screens are 10 feet long with a screen opening size of 0.010 inches. A clean, coarse sand fill was placed as a filter material to one foot above the top of screen and then a 2 foot thick bentonite seal was installed. It should be noted that some VOC's were detected at EW-20B to a maximum reading of 5 ppm, while EW-20C readings were up to 75 ppm.

Jomo Reynolds and I laid out the location for extraction well EW-13A. A string was run straight from the manhole at EW-13 to clean out and the extraction well was marked mid distance between these points.

The contractor received shipment of approximately 150 cyds of clean, coarse sand for use as backfill at interceptor trench EW-19.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB | REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 02/15/01

CLIENT: Contract Dewatering Services
WEATHER: Cloudy 32 F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 31

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 75 ppm (instantaneous reading) and ranged from 0 to 14 ppm (one minute average reading).

The contractor installed extraction wells EW-20B and EW-20C at stations 1+76 and 2+64, respectively. The contractor excavated a 36 inch diameter hole with a Gus Pech bucket rig. EW-20B was set at a depth of 10.5 feet below grade and EW-20C was set at a depth of approximately 12 feet below grade. The extraction wells were constructed of 8 inch diameter stainless steel screens and risers.

FIELD REPRESENTATIVE: SHB
REVIEWED BY:

HANSON
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Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/14/01
WEATHER: Rain/ Sleet 32 F
REPORT NO: 30A
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
EW-20	8:30	0	0	0	Background
STA 3+20	9:00	0	0	0	
STA 3+20	9:30	1.6	1.6	1.6	Digging hole
STA 3+20	10:00	28.1	28.1	28.1	
STA 3+20	10:30	57.5	57.5	57.5	Backfilling hole
STA 3+20	11:00	5.1	5.1	5.1	
Lunch	11:30	0.6	0.6	0.6	
Lunch	12:00				
EW-20A	12:30	0	0	0	
EW-20A	13:00	0	0	0	Drill and install
EW-20A	13:30	0	0	0	EW-20A
EW-20A	14:00	0	0	0	
EW-20A	14:30	0	0	0	
EW-20A	15:00	0	0	0	
EW-20A	15:30	0	0	0	
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 30

PROJECT NO.: 00192-011 DATE: 02/14/00 SHEET 2 OF2

PROGRESS OF WORK:

believe the tile was found at a depth of 11 feet below ground surface. While probing for tile, a dark brown ground water was noted to be seeping up into the excavation bottom in one area.

The contractor installed EW-20A at approximately STA 0+87.5. The contractor excavated a 36 inch diameter hole with a Gus Pech bucket rig. The extraction well was set at a depth of 13 feet below the ground surface and consisted of a 10 foot screen with opening size of 0.010 inches. The well was 8 inches in diameter and constructed of stainless steel. A coarse, clean sand fill was placed to 1 foot above the well screen and then a 2 foot thick bentonite seal.

This writer also double checked ground surface elevations along proposed interceptor trench EW-19. The contractor can trench to a depth of 18 feet below grade with the trenching machine. However based on the ground surface, elevations and proposed invert elevations along EW-19, the contractor will need to bench but 10 feet along the proposed interceptor trench.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 02/14/01

CLIENT: Contract Dewatering Services

WEATHER: 32 F

CONTRACTOR(S): Contract Dewatering Services

REPORT NO.: 30

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed continuously and recorded at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings detected VOC's ranging from 0 to 120 ppm (instantaneous) and 0 to 57.5 ppm (15 second average) at approximately STA 3+20 (EW-20) and 0 ppm at EW-20 A (STA 0+87.5 feet). The air was sampled using detector tubes for Benzene, Methylene Chloride, Vinyl Chloride, Phenol and Chloroform. All detector tubes came back with a reading of 0 ppm for the contaminant tested.

The contractor excavated an approximate 6 foot deep hole, along the drain tile run at STA 3+20 of EW-20, to probe for the perforated end of the HDPE tile lost below grade. We

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FIELD REPRESENTATIVE: SHB

REVIEWED BY:

Extraction Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	2/12/01
PROJECT NO.:	**00192-011**	WEATHER:	Warm 37 F
LOCATION:	**Griffith, Indiana**	REPORT NO:	29B
CLIENT:	Contract Dewatering Services	SHEET 1 OF 2	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.
	Extraction Well No.	Coordinate System			
Proposed	EW-20	N 5256.3 E 5039.7	15.00	635.00	620.00
Actual	EW-20	N 6507.8 E 5265.6	16.62	636.60	619.98
Proposed	EW-20a	N 6471.8 E 5345.0	13.00	636.00	623.00
Actual	EW-20a	N 6489.0 E 5346.3	17.13	636.98	619.85
Proposed	EW-20b	N 6430.7 E 5434.4	13.00	636.00	623.00
Actual	EW-20b	N 6455.1 E 5432.2	14.92	637.92	623.00
Proposed	EW-20c	N 6391.9 E 5518.8	13.00	636.00	623.00
Actual	EW-20c	N 6416.4 E 5515.7	13.55	638.14	624.59
Proposed	CO	N 6355.6 E 5598.1	0.00	645.51	645.51
Actual	CO		n/a	n/a	n/a

HANSON
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Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/13/01
WEATHER: Warm 42 F
REPORT NO: 29a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
	10:00				
	10:30				
Background	11:00	0	0	0	
STA 2+00	11:30	76.8	76.8	25.5	
STA 3+00	12:00	177	177	27	
STA 3+40	12:30			18.0	
Lunch	13:00				
Lunch	13:30				
STA 3+30	14:00	13.1	13.1		
STA 3+20	14:30	10.2	10.2		
STA 2+00	15:00	0.4	0.4		
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 29

PROJECT NO.: 00192-011 | DATE: 02/13/00 | SHEET 2 OF2

PROGRESS OF WORK:

contaminant is likely a compound similar to Vinyl Chloride.

While trenching the clean out sweep from approximately STA 3+00 to 3+50, the perforated drain tile pulled off the interior connection to the solid drain tile. Attempts to exposed the buried, perforated HDPE drain tile failed due to caving of the trench side walls during excavation. The approximate location of the end of the perforated drain tile was marked and the are from STA 3+00 to 3+50 backfilled with spoils. The contractor will attempt to recover the drain tile at a later date.

In addition, the contractor worked on building work platforms for the bucket rig to install the extraction wells, EW-20a, EW-20b, and EW-20c.

The contractor began trenching operation at approximately 11:30 AM after unloading four precast manholes that arrived on-site this morning.

The wind today was light and generally blowing to the west or northwest.

Approximately 120 Tons of clean coarse sand backfill was installed around the perforated drain tile between STA 2+00 and STA 3+25.

FIELD REPRESENTATIVE: SHB REVIEWED BY: DK

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/13/01
CLIENT: Contract Dewatering Services
WEATHER: Warm 42 F
CONTRACTOR(S): Contract Dewatering Services

REPORT NO.: 29

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann
CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed at approximately 30 minute intervals during utility pipe repairs at the west and east end of the separation barrier wall. Air monitoring was performed at ground surface elevation and approximately 5 feet above the ground surface, simulating worker breathing zones. Air monitoring readings detected VOC's ranging from 0 to 387 ppm instantaneous readings, and 0 to 177 ppm, 15 second averaged readings.

Workers were kept out of the down wind area and a minimum of 15 feet from the chain during trenching operation. PID readings in the trenching cab ranged from 0 to 27 ppm (instantaneous). Detector tubes were used to check for Benzene, Methylene Chloride, Phenol and Vinyl Chloride. Benzene, methylene Chloride, and Phenol detector tubes results were negative (0ppm). The Vinyl Chloride tube at approximately STA 2+20 had a very light violet like color change to approximately 13 ppm. Due to the very light color change the

FIELD REPRESENTATIVE: SHB REVIEWED BY:

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	2/12/01
PROJECT NO.:	**00192-011**	WEATHER:	Warm 37 F
LOCATION:	**Griffith, Indiana**	REPORT NO:	28B
CLIENT:	Contract Dewatering Services	SHEET 1 OF 2	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.
	Extraction Well No.	Coordinate System			
Proposed	EW-20	N 5256.3 E 5039.7	15.00	635.00	620.00
Actual		N 6507.8 E 5265.6	16.62	636.60	619.98
Proposed	EW-20a	N 6471.8 E 5345.0	13.00	636.00	623.00
Actual		N 6489.0 E 5346.3	17.13	636.98	619.85
Proposed	EW-20b	N 6430.7 E 5434.4	13.00	636.00	623.00
Actual		N 6455.1 E 5432.2	14.92	637.92	623.00
Proposed	EW-20c	N 6391.9 E 5518.8	13.00	636.00	623.00
Actual		N 6416.4 E 5515.7	13.55	638.14	624.59
Proposed	CO	N 6355.6 E 5598.1	0.00	645.51	645.51
Actual			n/a	n/a	n/a

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PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/12/01
WEATHER: Warm 37 F
REPORT NO: 28a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
Calibration	8:30				
Background	9:00	0	0	0	
	9:30	0	0	0	
	10:00	0	0	0	
	10:30	0	0	0	
Lunch	11:00				
Lunch	11:30				
	12:00	0	0	0	
	12:30	0	0	0	
STA 0+00	13:00	0	0	0	
STA 1+00	13:30			2.6	
STA 1+88	14:00	0	0	0	
STA 2+00	14:30	3.5	3.5	3.5	
Shut down by MW	15:00	0	0	0	
	15:30	0	0	0	
Go to Level C	16:00	0	0	0	
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 28

PROJECT NO.: 00192-011 DATE: 02/12/00 SHEET 2 OF2

PROGRESS OF WORK:

Trenching operations resumed at approximately 2:30 PM. The contractor trenched for approximately 10 minutes (after getting the chain moving again) before operations were shut down by Montgomery Watson. Montgomery Watson was reportedly getting PID readings spiking up to 40 ppm while standing approximately 20 feet directly down wind from the chain. At the same time, PID readings in the trencher cab spiked up to a maximum of 3.5 ppm.

The contractor installed 200 feet of the interceptor drain before stopping to set up the exclusion zone required for Level C PPE. The drain tile was set approximately 15 feet below existing ground surface and backfilled with a clean coarse sand to approximately 3 feet below finish grade.

Work will resume at 7:30 AM tomorrow, stating with a safety meeting my Montgomery Watson (Lee Orosz).

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
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Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site	PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana	DATE: 02/12/01
CLIENT: Contract Dewatering Services	WEATHER: Warm 37 F
CONTRACTOR(S): Contract Dewatering Services	SHEET 1 OF 2
	REPORT NO.: 28

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann

CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed at approximately 30 minute intervals during utility pipe repairs at the west and east end of the separation barrier wall. Air monitoring was performed at ground surface elevation and approximately 5 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 32 ppm (instantaneous reading) or 3.5 ppm (average for a 1 minute interval). A reading above 1 ppm necessitates a change of PPE (personal protective equipment) to Level C. Once an instantaneous reading greater than 1 ppm was obtained at approximately 1:45 pm I sampled the air with detector tubes for Benzene, Vinyl Chloride and Methylene Chloride. All tubes were negative (0 ppm) for their respective compounds.

Just as the contractor entered the contamination zone, they shut down trenching operations and replaced four cutters on the trencher chain. PID readings were 0 ppm during this procedure.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

Separation Barrier Wall

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/8/01
WEATHER: Warm 50 F
REPORT NO: 27a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
	10:00				
	10:30				
0+00	11:00	0	0	0.0	
0+00	11:30	0	0	0.0	
	12:00				
	12:30				
0+00	13:00	0	0	0	
0+05	13:30	0	0	0	
0+05	14:00	0	0	0	
0+05	14:30	0	0	0	
0+00	15:00	0	0	0	
0+00	15:30	0	0	0	
0+05	16:00	0	0	0	
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 27

PROJECT NO.: 00192-011 | DATE: 02/08/00 | SHEET 2 OF2

PROGRESS OF WORK:

the trencher, leaving it tilted to the west at the top of the well. Further trenching did not pull the well and no drain tile feed noted. Removing the boom arm out of the ground revealed that the drain tile connection to the extraction well had pulled apart. The contractor then removed the stainless steel extraction well from the trench. Since this is the second time this problem has occurred, the contractor is going to change the drain tile boot feed to eliminate the feed problem. Trenching will resume on Monday, February 12, 2001.

It should be noted that the contractor was constantly pumping water from the work platform because snow melt from approximately 2/3 of the site drained to this location (low spot on-site).

FIELD REPRESENTATIVE: SHB

REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/07/01
CLIENT: Contract Dewatering Services
WEATHER: Cloudy 32 F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 27

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann
CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 minute intervals during utility pipe repairs at the west and east end of the separation barrier wall. Air monitoring was performed at ground surface elevation and approximately 5 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0 ppm.

The contractor removed water and ice from the work platform for interceptor trench EW-20 and set up the trenching machine at EW-20. The 6 inch diameter HDPE drain tile was connected to the 8 inch diameter stainless steel extraction well with a 10 foot long well scree with a 0.01 opening.

The contractor lowered the boom arm until the EW-20 was set vertical at elevation 620.00. The contractor then removed the pin and began trenching away from EW-20. However, the drain tile did not feed properly and pulled the bottom of the well along with

FIELD REPRESENTATIVE: SHB
REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/7/01
WEATHER: Cloudy 32 F
REPORT NO: 26a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
E. End Utility	8:30				
Crossing	9:00	0	0		
"	9:30	0	0		
W. End Utility	10:00	0	0		
Crossing	10:30	0	0		
"	11:00	0	0		
"	11:30	0	0		
Lunch	12:00				
Lunch	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 26

PROJECT NO.: 00192-011 DATE: 02/07/00 SHEET 2 OF2

PROGRESS OF WORK:

powder.

At the west end utility crossing, the 2" diameter HDPE pipe was repaired by fusing a new piece of pipe to the ends of the existing pipe. The 1" diameter pipe had an end cap fused on the pipe on the north side of the slurry wall. The pipes were buried approximately 2 feet below grade as directed by Lee Orosz of Montgomery Watson. Backfill consisted of spoils and approximately 700 pounds of bentonite powder.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana | DATE: 02/07/01
CLIENT: Contract Dewatering Services | WEATHER: Cloudy 32 F
CONTRACTOR(S): Contract Dewatering Services | SHEET 1 OF 2
REPORT NO.: 26

CLIENT'S REPRESENTATIVE(S): Mr. Richard Neumann
CONTRACTOR'S REPRESENTATIVE: Mr. Richard Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a Photo vac 2020 PID with a 10.6eV lamp. Air monitoring was performed at approximately 30 minute intervals during utility pipe repairs at the west and east end of the separation barrier wall. Air monitoring was performed at ground surface elevation and approximately 5 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0 ppm. The PID was calibrated with isobutylene gas at 100 ppm.

The contractor loaded and removed the large trencher from the site.

The utility line crossing at the east end of the slurry wall alignment was repaired as directed by Lee Orosz of Montgomery Watson. The HDPE pipes on the north side (1" and 2" diameter) had caps fused on the ends.

The south side pipes were duct taped. The pipes were backfilled with spoils and bentonite added along the slurry wall alignment. Backfill consisted of spoils and bentonite

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Elevation of Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/23/01 9:00 AM	6+65	644.75	+3 1/2"	27.29	617.46			
1/23/01 9:30 AM	6+80	644.75	-54"	22.5	622.25			
1/23/01 9:40 AM	6+75	644.75	-50"	22.83	621.92			
1/23/01 10:00 AM	6+55	644.75	+8"	27.66	617.08			
1/23/01 10:20 AM	6+45	644.75	+20 1/4"	28.69	616.06			
1/23/01 11:00 AM	6+35	644.75	+19 3/4"	28.65	616.10			
1/23/01 11:30 AM	6+25	644.75	+26 1/4"	29.19	615.56			
1/23/01 2:30 PM	6+15	644.70	+23 1/4"	28.94	615.76			

* Determine at 10' Intervals
** Determine at 3 locations along trench alignment

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Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name: ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/23/01 3:00 PM	6+05	644.70	+25"	29.08	615.62			
1/23/01 3:30 PM	5+95	644.70	+25 ½"	29.13	615.58			
1/23/01 3:45 PM	5+85	644.70	+24"	29.0	615.7			
1/23/01 4:00 PM	5+75	644.70	+25 3/4"	29.15	615.55	644.05	29.53	614.52
1/24/01 10:00 AM	5+75	643.35	+12"	28.0	615.35			
1/24/01 10:15 AM	5+65	643.35	+14 1/2"	28.21	615.14			
1/24/01 10:53 AM	5+55	643.35	+16"	28.33	615.01			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialties

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/24/01 11:15 AM	5+45	643.35	19 3/4"	28.65	614.70			
1/24/01 1:30 AM	5+35	643.35	22 1/4"	28.85	614.5			
1/29/01	5+25	643.21	20 5/8"	28.71	614.5			
1/29/01	5+15	643.27	20 5/8"	28.71	614.5			
1/29/01	5+05	643.21	24"	29.0	614.21			
1/29/01	4+95	643.21	24"	29.0	614.21			
1/29/01	4+85	643.21	20"	28.67	614.5			
1/29/01	4+75	643.21	20"	28.67	614.5			

* Determine at 10' Intervals
** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Ground Surface Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/29/01	4+65	639.43	2.0'	25.0	614.43			
1/29/01	4+55	639.40	2.0'	25.0	614.40			
1/29/01	4+45	639.19	2.0'	25.0	614.19			
1/29/01	4+35	639.24	2.5'	24.5	614.74			
1/29/01	4+25	639.21	2.5'	24.5	614.71			
1/29/01	4+15	639.27	2.5'	24.5	614.77			
1/29/01	4+05	639.25	2.5'	24.5	614.75			
1/29/01	3+95	639.13	2.5'	24.5	614.63			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name: ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Ground Surface Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/30/01	3+85	638.93	3.0'	24.0	614.93			
1/30/01 9:25 AM	3+75	638.85	3.35'	23.65	615.2			
1/30/01	3+65	638.79	3.5'	23.5	615.29			
1/30/01 10:30 AM	3+55	638.77	3.5'	23.5	615.27			
1/31/01	3+45	638.67	4.0'	23.0	615.67	645.30	29.44	615.86
1/31/01	3+35	638.45	4.0'	23.0	615.45			
1/31/01	3+25	638.25	4.0'	23.0	615.25			
1/31/01	3+15	638.17	4.0'	23.0	615.17			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Top of Probe	Length of Probe	Bottom Elevation of Trench **
1/31/01	3+05	638.17	4.0'	23.0	615.17			
1/31/01	2+95	637.97	4.0'	23.0	614.97			
1/31/01	2+85	637.79	4.0'	23.0	614.79			
1/31/01	2+75	637.99	3.25'	23.75	614.74			
1/31/01	2+65	638.11	3.5'	23.5	614.61			
1/31/01	2+55	638.21	3.5'	23.5	614.71			
1/31/01	2+45	639.21	3.5'	23.5	615.71			
1/31/01	2+35	638.17	3.5'	23.5	614.67			

* Determine at 10' Intervals
** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Top of Probe	Length of Probe	Bottom Elevation of Trench **
1/31/01	2+25	637.87	3.5'	23.5	614.37			
1/31/01	2+15	639.31	3.0'	24.0	615.31			
1/31/01	2+05	638.87	4.0'	23.0	615.87			
1/31/01	1+95	638.23	4.25'	22.75	615.48			
1/31/01	1+85	638.21	4.0'	23.0	615.21			
1/31/01	1+75	638.11	4.0'	23.0	615.11			
1/31/01	1+65	638.20	3.5'	23.5	614.7			
1/31/01	1+55	637.99	3.5'	23.5	614.49			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Ground Surface Elevation	Elevation of Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Top of Probe	Length of Probe	Bottom Elevation of Trench **
1/31/01	1+45	638.01	3.0'	24.0	614.01			
1/31/01	1+35	638.07	2.5'	24.5	613.57			
1/31/01	1+25	638.29	2.5'	24.5	613.79			
1/31/01	1+15	638.13	2.5'	24.5	613.63	645.30	31.81'	613.49
1/31/01	1+05	637.15	2.5'	24.5	613.65			
1/31/01	0+95	638.10	3.0'	24.0	614.10			
1/31/01	0+85	638.25	3.0'	24.0	614.25			
1/31/01	0+75	638.11	3.0'	24.0	614.11			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Ground Surface Elevation	Elevation of Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Top of Probe	Length of Probe	Bottom Elevation of Trench **
1/31/01	0+65	638.03	3.5'	23.5	614.53			
1/31/01	0+55	638.41	3.5'	23.5	614.91			
1/31/01	0+45	638.23	3.5'	23.5	614.73			
2/1/01	0+35	638.40	3.0'	24.0	614.4			
2/1/01	0+25	637.81	3.0'	24.0	613.81			
2/1/01	0+15	638.02	3.0'	24.0	614.02			
2/1/01	0+05	637.41	3.0'	24.0	613.41			
2/1/01	0+03	637.40	3.0'	24.0	613.40			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON
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DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
LOCATION: Griffith, Indiana
CLIENT: Contract Dewatering Services
CONTRACTOR(S): Contract Dewatering Services

PROJECT NO.: 00192-011
DATE: 02/06/01
WEATHER: Ptly. Sunny 35 F
SHEET 1 OF 2
REPORT NO.: 25

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford
CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to observe decontamination procedure and to jet probe the bottom of the slurry trench.

The contractor completed decontamination of the trenching machine. In addition, the contractor jet probed the slurry trench in two additional locations, STA 3+45 and 1+15. Based on jet probes, the bottom of trench elevations at STA 3+40 and 1+00 were 615.86 and 613.49, respectively.

The probes did encounter solid ground at the trench bottom. The observation of trench depth along the alignment is attached.

No air monitoring was performed today. I did receive the Chloroform detector tubes ordered approximately 10 days ago.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB

REVIEWED BY:

Separation Barrier Wall

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/5/01
WEATHER: Cloudy 34 F
REPORT NO: 24a
SHEET 1 OF 1

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
Decon. Area	9:00	0	0		
Decon. Area	9:30	0	0		
Decon. Area	10:00	0	0		
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 24

PROJECT NO.: 00192-011 DATE: 02/05/00 SHEET 2 OF2

PROGRESS OF WORK:

the trencher boom arm. The trencher has a new and heavier chain and cutting teeth.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/05/01
CLIENT: Contract Dewatering Services
WEATHER: Cloudy 34 F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 24

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford
CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to probe the slurry wall trench depth and to observe decontamination operations and perform air monitoring. Air monitoring was performed with a Photo Vac 2020 PID with a 10.6 eV lamp. Air monitoring was performed during decontamination operations in the morning. Air monitoring was performed at ground surface elevation and at approximately 5 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0 ppm.

The contractor decontamination of the excavator and trenching machine began today. The excavator was completed while the trencher decontamination will be completed tomorrow. Problems with the steam cleaner heating unit and low water pressures slowed the decontamination process. The contractor delayed the water jetting probe of the trench depth until tomorrow.

The contractor did off load the new trench and attached the sand hopper and boot to

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FIELD REPRESENTATIVE: SHB

REVIEWED BY: RH

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RECORD OF SOIL-BENTONITE MIX SAMPLE

Project Name ACS Separation Barrier Wall   Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Sample Number	Depth Interval of Sample	Slump	Wet Density Volume/Weight
2/02/01 10:30 AM	2+95	S-6	12'-15'	8 "	122.0 pcf
2/02/01 11:15 AM	1+80	S-7	11'-14'	6 3/4"	120.0 pcf
2/02/01 12:00 PM	1+05	S-8	12'-15'	8"	120.8 pcf
2/02/01 1:00 PM	0+30	S-9	12'-15'	9"	125.6 pcf

Slump and unit weight samples taken at 75' intervals. First sample at 15' from start. Permeability testing to be taken every other sample at 150' intervals.

Submit to laboratory for:

1.) WC Determination

2.) Calculation of Dry Density

3.) Permeability with tap water

Separation Barrier Wall

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/5/01
WEATHER: Cold -1 F
REPORT NO: 23a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
Decon Area	8:00	0	0		
"	8:30	0	0		
"	9:00	0	0		
"	9:30	0	0		
"	10:00	0	0		
STA 2+95	10:30	0	0		
"	11:00	0	0		
"	11:30	0	0		
"	12:00	0	0		
"	12:30	0	0		
"	13:00	0	0		
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 23

PROJECT NO.: 00192-011 DATE: 02/01/00 SHEET 2 OF2

PROGRESS OF WORK:

trench. Samples were collected at STA 0+30, 1+05, 1+80, and 2+95. The slump and unit weight of the slurry ranged from 7 3/4 to 9 inches and 120 to 125.6 pcf, respectively.

See the attached record of soil-bentonite mix sample for actual slump and unit weights for each sample.

Work will resume at 8:00 AM on Monday, February 5, 2001.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 02/02/01
CLIENT: Contract Dewatering Services
WEATHER: Cold -1 F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 23

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford
CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a PhotoVac 2020 PID with a 10.6eV lamp. Air monitoring was performed within the exclusion zone during sampling and trench backfill. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0 ppm.

Montgomery Watson allowed the contractor to remove the exclusion zone since the trench installation is complete and the PID is not detecting any VOC's.

The contractor had planned on decontaminating the trenching machine, off loading the new trencher and loading the decontaminated machine off site. However the new trencher would not start this morning. In addition, the water in the steam cleaner was freezing before the contractor could start the heater.

Four samples of the slurry wall were obtained at approximately mid depth of the

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FIELD REPRESENTATIVE: SHB REVIEWED BY: ab

HANSON
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Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 2/1/01
WEATHER: Sunny 26F
REPORT NO: 22a
SHEET 1 OF 1

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
STA 0+45	8:00	0	0		Trencher Repairs
"	8:30	0	0		"
"	9:00	0	0		"
"	9:30	0	0		"
"	10:00	0	0		"
"	10:30	0	0		"
"	11:00	0	0		"
	11:30				"
	12:00				"
STA 0+45	12:30	0	0		"
"	13:00	0	0		"
"	13:30	0	0		"
"	14:00	0	0		"
"	14:30	0	0		"
STA 0+40	15:00	0	0	0	Trenching
STA 0+20	15:30		0	0	
STA 0+05	16:00		0	0	
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 22

PROJECT NO.: 00192-011 DATE: 02/01/00 SHEET 2 OF2

PROGRESS OF WORK:

busy repairing the chain and backfilling the completed portion of the trench. The backfill consisted of soil-bentonite slurry that accumulated on the side of the trench during trenching operations.

The other trenching machine arrived on-site at approximately 3:30 PM.

The ground surface elevations along the trench were obtained from station 0+45 to 6+85 at 10 foot increments.

Work will resume on Friday, February 2 at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana | DATE: 02/01/01

CLIENT: Contract Dewatering Services | WEATHER: Sunny 26F

CONTRACTOR(S): Contract Dewatering Services | SHEET 1 OF 2

REPORT NO.: 22

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a PhotoVac 2020 PID with a 10.6eV lamp. Air monitoring was performed at approximately 30 minute intervals during trenching operations. Air monitoring was performed in the cab of the trencher simulating the worker breathing zone. Personnel around the trenching operation on the ground was kept to a minimum for worker safety. Air monitoring readings did not detect any VOC's above 0 ppm.

No detector tubes were used since the action level of 1 ppm was not attained.

The chain on the trenching machine broke twice during the morning. Trenching operations began at approximately 3 PM after several links in the chain were replaced. The contractor completed the soil-bentonite separation barrier wall installation. The machine was stopped when it was 3 feet from the existing perimeter wall. The contractor now needs to repair the utility lines crossing the soil bentonite wall.

No soil-bentonite slurry samples were obtained today because the excavator was kept

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

Separation Barrier Wall

HANSON
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Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 1/31/01
WEATHER: Cloudy 34 F
REPORT NO: 21a
SHEET 1 OF 1

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
Zeroing	8:00		0	0	
STA 3+55	8:30		0	0	
STA 3+35	9:00		1.1	1.1	
STA 2+95	9:30		2.0	2.0	
STA 2+55	10:00		3.3	3.3	
STA 2+35	10:30		3.0	3.0	
STA 2+15	11:00		2.6	2.6	
STA 1+95	11:30		3.1	3.1	
Lunch	12:00				
Lunch	12:30				
STA 1+85	13:00		3.4	3.4	
STA 1+65	13:30		3.4	3.4	
STA 1+45	14:00		2.4	2.4	
STA 1+25	14:30		2.9	2.9	
STA 1+00	15:00		3.2	3.2	
STA 0+75	15:30		1.7	1.7	
STA 0+45	16:00		2.3	2.3	
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 21

PROJECT NO.: 00192-011 DATE: 01/31/00 SHEET 2 OF2

PROGRESS OF WORK:

approximately 4:00 pm due to a train arriving at the ACS plant on the rail road tracks adjacent to the trench.

Three samples of the soil bentonite slurry were obtained at stations 4+85, 4+45, and 3+70. The sample at station 4+85 was off-set from station 5+20 due to the locally stronger contamination encountered during trenching operations. The results of the slump and unit weights are attached on the record of soil-Bentonite mix sample. The depth of the trench was determined by measuring from a known point on the boom arm down to the ground surface.

The ground surface elevations along the trench will be obtained at a later date and the bottom of trench elevation determined from this data. The bottom of trench elevation method of determination was adjusted due to the exclusion zone and additional time spent performing air monitoring (especially detector tubes).

Work will resume on Thursday, February 1 at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY: [illegible]

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site	PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana	DATE: 01/31/01
CLIENT: Contract Dewatering Services	WEATHER: Cloudy 34F
CONTRACTOR(S): Contract Dewatering Services	SHEET 1 OF 2
	REPORT NO.: 21

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a PhotoVac 2020 PID with a 10.6eV lamp. Air monitoring was performed in the cab of the trencher simulating the worker breathing zone. Personnel around the trenching operation, on the ground was kept at a minimum, for worker safety. Air monitoring readings did not detect any VOC's above 10 ppm.

Per the Health and Safety Plan, Dragger detector tubes for Benzene, Vinyl Chloride, and Methylene Chloride were run and the results were negative. Two sets of detector tubes for the above contaminants were run in the morning and one set in the afternoon.

Montgomery Watson's Lee Orosz held a brief Health and Safety meeting to start the day. The concept of the exclusion zone and decontamination of equipment and boots were discussed.

The contractor installed approximately 315 linear feet of slurry wall from approximately station 0+40 to 3+55. Montgomery Watson stopped trenching operations at

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 1/30/01
WEATHER: Rain 36-40 F
REPORT NO: 20a
SHEET 1 OF 1

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm) G.S.	5 ft.	10 ft.	Remarks
Zeroing	7:30		0	0	
STA 3+95	8:00		3	3	
STA 3+85	8:30		5	5	
STA 3+80	9:00		5.0	5.0	
STA 3+75	9:30		4.0	4.0	
STA 3+65	10:00		3	3	
STA 3+60	10:30		5	5	
	11:00				Instrument HNU PID
	11:30				broke down due to
	12:00				vibrations in trencher.
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 2

PROJECT NO.: 00192-011 DATE: 01/30/00 SHEET 2 OF2

PROGRESS OF WORK:

a Photovac 2020 PID with a 10.6 eV lamp and digital display.

The contractor spent the rest of the afternoon repairing the trenching machine. An attempt at sampling the slurry wall was aborted when the center rod extending above the top of the 4 inch diameter pipe broke while moving the sampler into the exclusion zone. The contractor repaired the broken rod by welding it back together. Sampling will be attempted again on Wednesday.

Due to concerns about Level C procedures at the site, Montgomery Watson will hold a health and safety meeting at 7:30 AM tomorrow. According to Lee Orosz with Montgomery Watson, areas of concern are the exclusion zone, decontamination of personnel equipment, and welding in the exclusion zone.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana | DATE: 01/30/01

CLIENT: Contract Dewatering Services | WEATHER: Rain 36-40 F

CONTRACTOR(S): Contract Dewatering Services | SHEET 1 OF 2

REPORT NO.: 20

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, the writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a HNU PID with a 10.2eV lamp, taking readings in the cab of the trencher during trenching operations by the operator. According to the operator (Dennis Karrer), he detected VOC's 5 ppm and less.

Approximately 40 linear feet of trench was installed before the bearing at the lowerer sprocket failed and shut down trenching operations. At this time, I had suited up to pull detector tube samples at the trenching machine location. A check of the HNU-PID showed the instrument was no longer working properly (meter was pegged down below zero). It appears the vibration of the trenching machine is causing the instrument calibration/ zero to change.

While workers removed the chain and boom arm extension detector tubes were used to check for Benzene, Vinyl Chloride, Methylene Chloride and Phenol. All detector tubes showed no color change or 0ppm for these contaminants. The HNU-PID was exchanged for

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Ground Surface Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/29/01	4+65	639.43	2.0'	25.0	614.43			
1/29/01	4+55	639.40	2.0'	25.0	614.40			
1/29/01	4+45	639.19	2.0'	25.0	614.19			
1/29/01	4+35	639.24	2.5'	24.5	614.74			
1/29/01	4+25	639.21	2.5'	24.5	614.71			
1/29/01	4+15	639.27	2.5'	24.5	614.77			
1/29/01	4+05	639.25	2.5'	24.5	614.75			
1/29/01	3+95	639.13	2.5'	24.5	614.63			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/24/01 11:15 AM	5+45	643.35	19 3/4"	28.65	614.70			
1/24/01 1:30 AM	5+35	643.35	22 1/4"	28.85	614.5			
1/29/01	5+25	643.21	20 5/8"	28.71	614.5			
1/29/01	5+15	643.27	20 5/8"	28.71	614.5			
1/29/01	5+05	643.21	24"	29.0	614.21			
1/29/01	4+95	643.21	24"	29.0	614.21			
1/29/01	4+85	643.21	20"	28.67	614.5			
1/29/01	4+75	643.21	20"	28.67	614.5			

* Determine at 10' Intervals
** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/23/01 3:00 PM	6+05	644.70	+25"	29.08	615.62			
1/23/01 3:30 PM	5+95	644.70	+25 ½"	29.13	615.58			
1/23/01 3:45 PM	5+85	644.70	+24"	29.0	615.7			
1/23/01 4:00 PM	5+75	644.70	+25 3/4"	29.15	615.55	644.05	29.53	614.52
1/24/01 10:00 AM	5+75	643.35	+12"	28.0	615.35			
1/24/01 10:15 AM	5+65	643.35	+14 1/2"	28.21	615.14			
1/24/01 10:53 AM	5+55	643.35	+16"	28.33	615.01			

* Determine at 10' Intervals
** Determine at 3 locations along trench alignment

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

OBSERVATION OF TRENCH DEPTH

Project Name ACS Separation Barrier Wall

Project Number: 00192-011

Project Location: Griffith, Indiana

Date/ Time	Station	Instrument Elevation	Elevation of Reference on Trencher	Depth to Bottom of Trencher Boom *	Bottom Elevation of Trench *	Elevation of Instrument	Length of Probe	Bottom Elevation of Trench **
1/23/01 9:00 AM	6+65	644.75	+3 1/2"	27.29	617.46			
1/23/01 9:30 AM	6+80	644.75	-54"	22.5	622.25			
1/23/01 9:40 AM	6+75	644.75	-50"	22.83	621.92			
1/23/01 10:00 AM	6+55	644.75	+8"	27.66	617.08			
1/23/01 10:20 AM	6+45	644.75	+20 1/4"	28.69	616.06			
1/23/01 11:00 AM	6+35	644.75	+19 3/4"	28.65	616.10			
1/23/01 11:30 AM	6+25	644.75	+26 1/4"	29.19	615.56			
1/23/01 2:30 PM	6+15	644.70	+23 1/4"	28.94	615.76			

* Determine at 10' Intervals

** Determine at 3 locations along trench alignment

Barrier Wall Starter Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	ACS Clean-up Site	DATE:	1/29/01
PROJECT NO.:	00192-011	WEATHER:	Rain 34-38F
LOCATION:	Griffith, Indiana	REPORT NO:	19a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm) G.S.	5 ft.	10 ft.	Remarks
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
STA 4+85	10:00	20	20	20	
STA 4+75	10:30	200	200	200	
STA 4+65	11:00	50	50	50	
STA 4+35	11:30		70	70	
STA 4+30	12:00		15	15	
Lunch	12:30				
STA 4+30	13:00		15	15	Reading from operator
STA 4+25	13:30		10	10	"
STA4+20	14:00		5	5	"
STA 4+05	14:30		2	2	"
STA 3+95	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 19

PROJECT NO.: 00192-011 DATE: 01/29/00

PROGRESS OF WORK:

check for the presence of Vinyl Chloride, Methylene Chloride, Benzene, and Phenol. There was no color change in the Vinyl Chloride and Phenol tubes. The Methylene Chloride tube turned a light blue-green in color not the brownish green associated with Methylene Chloride and was less than approximately 50 ppm. These tubes were designed to detect Methylene Chloride from 100 to 2,000 ppm. The Benzene tube turned a pale translucent yellow (to approximately 1 ppm) rather than the brownish- yellow associated with Benzene.

After sampling with detector tubes, Mr. Medford decided to continue trenching operations and did not take any air samples because there were no Tedlar Bags or vacuum pump for air sampling at the site.

I informed Barry Medford of Contact Dewatering Services that the PID was detecting VOC's at greater than 20 ppm, greater than 100ppm, greater than 150 ppm and up to 200 ppm while air sampling with detector tubes (approximately 30-40 minutes to sample with all 4 detector tubes). Mr. Medford decided to continue trenching operations. The PID was set inside the machine cab to check operator exposure. PID readings varied from approximately 5 to 70 ppm in the cab until approximately 11:30 AM. From 11:30 AM to 12:00 the PID readings ran from 2 to 15 ppm. After lunch the contractor left the PID in the cab of the trenching machine and monitored the air readings. According to the operator, reading coninued to run between 2 to 15 ppm all afternoon.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 19

PROJECT NO.: 00192-011 DATE: 01/29/00

PROGRESS OF WORK:

use in the presence of Vinyl Chloride and Methylene Chloride no matter level of concentration or time of duration. I spoke with a customer service representative (Tammy) and was informed that there are no standard cartridges for these compounds. MSA recommends using a canister type gas mask with an airline when Methylene Chloride is present at less that 5,000 ppm in the atmosphere. She had no information on Vinyl Chloride.

I called Greg Pierce with Otwell-Mawby to relay this information. Based on this information and what he had found, Greg recommended that we use supplied air while using detector tubes to determine contaminant(s). If the detector tubes did not identify the contaminants then an air sample should be obtained in a Tedlar bag (while in supplied air) and sent to a lab for analysis. I informed Berry Medford of Contract Dewatering Services of this information. Mr. Medford requested that I see if we could get supplied air equipment on-site for level B. I requested that Travis of Montgomery Watson check with Lee Orcozo of Montgomery Watson to see if he had any equipment at the water treatment plant. In the meantime, I contacted Total Safety to see what was needed. Total Safety was not sure they could have us set up for SCBA immediately. At this time, Berry Medford informed me that he had talked to Lee Orosz of Montgomery Watson and Lee said we could take detector tube samples in Level C full face respirator PPE.

Prior to the start of trenching operations, all personnel working in the exclusion zone were dressed with Level C PPE (full face respirator with P100 organic vapor cartridges, full tyvex suit, latex gloves, boots, and hard hats). Dragger brand detection tubes were used to

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 01/29/01

CLIENT: Contract Dewatering Services
WEATHER: Rain 34-38F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 3

REPORT NO.: 19

CLIENT'S REPRESENTATIVE(S): Mr. John Flak

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed almost continuously during trenching operations from approximately 10 AM to noon. Air monitoring was generally performed at ground surface elevation or at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings were highly variable with VOC levels ranging from 5 to approximately 200 ppm.

Prior to start of work, I contacted Greg Pierce with Otwell- Mawby to check on flow chart for Level C air sampling and PPE proceedures. Mr. Pierce stated he was still working on it and had found several new chemicals of concern besides Benzene, Chloroform, Phenol, Vinyl Chloride and Methylene Chloride. Also no progress had been made on determining if a full face respirator with cartridges could be used in the presence of Vinyl Chloride and/or Methylene Chloride.

I then contacted Mine Safety Appliances Co. (MSA) to determine why their instruction manual for my MSA Ultra-Twin Respirator stated that this respirator is not for

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FIELD REPRESENTATIVE: SHB REVIEWED BY:

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 18

PROJECT NO.: 00192-011 | DATE: 01/26/00 | SHEET 2 OF2

PROGRESS OF WORK:

Pierce. Mr. Pierce noted that Methylene Chloride is also on the list of contaminants that the manufacturer says not to use for protection against. Mr. Pierce is checking into the reason for this statement and will contact me Monday regarding this issue.

Mr. Pierce is under the impression that this is because there are no cartridges for removing these contaminants from the air and if this is the case, we may need to go to supplied air (Level B PPE).

After discussing this issue with Greg Perce of Otwell-Mawby, I contacted John Flak of Contract Dewatering Services and informed him of the possibility that Level C PPE may not be adequate (and that Greg Pierce was looking into the problem).

Currently, work is scheduled to resume Monday, January 29 at 7:30 AM.

FIELD REPRESENTATIVE: SHB | REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 01/26/01
CLIENT: Contract Dewatering Services
WEATHER: Snow 24F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 3
REPORT NO.: 18
CLIENT'S REPRESENTATIVE(S): Mr. John Flak/ Mr. Barry Medford
CONTRACTOR'S REPRESENTATIVE: Mr. John Flak/ Mr. Barry Medford

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PROGRESS OF WORK:

On today's date, no work was performed at the above referenced job site. This writer picked up a full face respirator, P100/DV cartridges, wipes, and a spectacle kit from Total Safety; and then had lenses made to fit the spectacle kit.

I was also contacted by John Flak of Contract Dewatering Services and Greg Pierce of Otwell- Mawby and informed them that additional Dragger Detector Tubes would be required on-site Monday January 29 at the beginning of the work. According to Mr. Pierce the following tubes would be required at the site; Benzene 0.5-10ppm, Chloroform 2-10 ppm, Methylene Chloride 50-2,000 ppm, Phenol 1-20 ppm and Vinyl Chloride 0.5-30 ppm. Due to the lateness of the day and the fact that the manufacturer was closed, the chloroform tubes could not be obtained. The remaining tubes will be on site Monday morning. Mr. Flak talked to Mr. Lewis with Montgomery Watson and we will be allowed to borrow Chloroform tubes from Montgomery Watson until our shipment is received.

I also informed Mr. Pierce that while reading the manual for my full face respirator, I noted that the manufacturer does not recommend its use in the presence of Vinyl Chloride regardless of the concentration or time of exposure. I faxed a copy of the manual to Mr.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 17

PROJECT NO.: 00192-011 DATE: 01/25/00 SHEET 2OF2

PROGRESS OF WORK:

working on #1 but is currently checking short term and long term exposure limits.

Mr. Pierce does not recommend allowing half face respirators in areas of VOC readings above 20 ppm. He is concerned that of the 70 contaminants found in water sampling, a high concentration reading with only 1 or 2 vapor constituents may cause break through in filter cartridges and exceed workers PEL.

The contractor set up an exclusion zone around the trenching machine. Any workers entering and exiting the exclusion zone will be required to suit up going in and decontaminate on exiting. All items used in the exclusion zone will require decontamination, such as PID's, wrenches, hammers, sampling equipment, etc...

After setting up the exclusion zone, the contractor obtained a sample of the slurry at station 5+95 (outside of exclusion zone and installed prior to high VOC readings) at a depth interval of 12 to 15 feet below grade. The slurry had a slump of 5 ½ inches and a unit weight of 126.88 pcf. To date, the contractor has not probed for the trench bottom verification.

The contractor spent the afternoon backfilling over the SBW from approximately station 5+75 to station 6+85. The contractor backfilled by first pushing only slurry alongside the trench, into the trench and then covering the slurry with soils removed in the starter trench excavation process. It should be noted that I was off-site obtaining a full face respirator and having the HNU PID repaired during these operations. On arrival back at the site, the contractor was done backfilling the trench.

FIELD REPRESENTATIVE: SHB REVIEWED BY: DLV

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site — PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana — DATE: 01/25/01

CLIENT: Contract Dewatering Services — WEATHER: Sunny 24F

CONTRACTOR(S): Contract Dewatering Services — SHEET 1 OF 2

REPORT NO.: 17

CLIENT'S REPRESENTATIVE(S): Mr. Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. Barry Medford

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring.

The contractor started the day with a safety meeting at the Montgomery Watson water treatment plant. The meeting explained that air monitoring detected VOC's at up to 50 ppm downwind from the trencher the previous day. A benzene dragger tube detected no benzene constituents in the VOC's. At up to 50 ppm, level C with full face respirator will protect workers.

At the request of Mr. Medford of Contract Dewatering Services, I contacted Mr. Greg Pierce of Otwell Mawby (the writer of the site specific Health and Safety plan) to see if : 1) Using full face respirator will protect workers up to a detection of 50 ppm VOC based on the contaminants detected in latest sample results 2) Can we protect ourselves assuming that the contaminants are the 5 worst health hazards on the site based on known contaminants at the site and provide PPE for those items? Mr. Pierce does not think that following #2 is advisable at this time. Based on latest water sample test results we already have one previously unknown chemical hazard at site that was not noted in the RFB. Mr. Pierce is

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FIELD REPRESENTATIVE: SHB — REVIEWED BY: [signature]

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/24/01
PROJECT NO.:	**00192-011**	WEATHER:	Sunny, 24F
LOCATION:	**Griffith, Indiana**	REPORT NO:	16a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm) G.S.	5 ft.	10 ft.	Remarks
	7:30				
Background	8:00	0	0	0	
No trenching	8:30	-	-	-	
No trenching	9:00	-	-	-	
5+75	9:30	0.1	0.1	0.1	
5+70	10:00	0.1	0.2	0.2	
5+70	10:30	0.2	0.3	0.3	
5+63	11:00	0.2	0.3	0.3	
5+40	11:30	6.0	6.0	0.4	
Lunch	12:00	-	-	-	
Lunch	12:30	-	-	-	
5+40	13:00	0.2	0.2	0.0	
5+35	13:30		50.0		30 feet downwind
	14:00				shut down trenching
	14:30				operations
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 16

PROJECT NO.: 00192-011 DATE: 01/24/00 SHEET 3OF3

PROGRESS OF WORK:

increased during harder trenching between station 5+35 to 5+50. In addition, prior to readings of 10 to 50 ppm, the trencher sounded as though it may have hit either metal, or a cutting tooth that was broken against something hard. No metal debris was ever brought up to the ground surface. This occurred approximately 10 minutes prior to the 50 ppm reading.

According to Greg Pierce with Otwell Mawby, the writer of the site Health and Safety Plan, if we proceed to level C with full face respirators tyvex suits, gloves, and disposable boot covers so that workers will be protected at readings of 50 ppm.

At the contractors request, a near surface sample of the slurry mix was obtained at station 6+67 and tested. The slump ranged from 6 ½ to 7 inches and the wet unit weight was 124.76 pcf. A sample was bagged for possible moisture content and permeability testing in the laboratory.

A 3/4 inch diameter galvanized pipe was used to probe the bottom of the trench. However, even using the excavator bucket to push with the probe was only advanced 17 feet below grade. According to the contractor's representative, Mr. Todd Lewis of Montgomery Watson will accept only 3 probes along the SBW alignment as sufficient verification along with the elevation shots at 10 foot intervals. The contractor has decided to lower the probe by jetting water through the pipe. Due to air quality problems this work and sampling at station 5+95 was not completed today.

There will be a Health and Safety meeting at the Montgomery Watson water treatment plant at 7:30 AM to appease workers of the air quality and level C PPE criteria.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 01/24/01

CLIENT: Contract Dewatering Services

WEATHER: Sunny 24F

CONTRACTOR(S): Contract Dewatering Services

REPORT NO.: 16

CLIENT'S REPRESENTATIVE(S): Mr. John Flak

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings detected VOC's of 6ppm or less at approximately 11:30 AM. Prior to this time, the maximum VOC reading was 0.6 ppm at 11:10 AM. At 11:30 AM work stopped for lunch and trenching resumed at approximately 1:00pm. Readings were taken inside the trenching machine cab and a reading of 0 ppm was obtained. Readings outside the cab in worker zones were 0.2 ppm. At approximately 1:30 PM PID readings detected VOC's ranging from 7 to 50 ppm, 30 feet down wind from the trenching machine. A dragger tube test by Montgomery Watson did not reveal high concentrations of Benzene in the VOC's. Due to the very high VOC reading, Montgomery Watson shut down the job until work can begin in Level C personal protective equipment.

Based on visual observations and HNU PID readings, it appeared that VOC readings

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FIELD REPRESENTATIVE: SHB

REVIEWED BY:

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 1/23/01
WEATHER: Sunny, 34F
REPORT NO: 15a
SHEET 1 OF 1

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
Background	8:00	0	0	0	
STA 6+60	8:30	0	0	0	
STA 6+65	9:00	0.2	0.1	0.1	
STA 6+80	9:30	0.4	0.3	0.3	
STA 6+50	10:00	0.3	0.3	0.3	
STA 6+42	10:30	0.3	0.3	0.3	
STA 6+34	11:00	0.2	0.2	0.2	
STA 6+25	11:30	0.2	0.3	0.3	
Lunch	12:00	-	-	-	
Lunch	12:30	-	-	-	
STA 6+80	13:00	0.2	0.2	0.2	
STA 6+80	13:30	0.2	0.2	0.2	
No Reading	14:00	-	-	-	
No Reading	14:30	-	-	-	
STA 6+00	15:00	0.3	0.4	0.4	
STA 5+90	15:30	0.3	0.3	0.3	
STA 5+80	16:00	0.3	0.3	0.3	
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 15

PROJECT NO.: 00192-011 DATE: 01/23/00 SHEET 2 OF2

PROGRESS OF WORK:

perimeter wall). The trencher then worked back along the trench keying into the clay approximately 2 feet. It should be noted that based on top of clay elevations, it appears the eastern most portion of the SBW alignment (approximately station 6+70 to 6+85) contains a high spot of clay. The top of clay elevations at station 6+80 and station 6+65 varied by approximately 5 feet, once trenching continued to the west of station 6+65 the clay layer continued to slope down ward such that at station 6+05 the top of clay was elevation 618.2. The contractor constructed approximately 120 linear feet of slurry wall today.

A sample of the slurry wall was obtained at station 6+67 at a depth interval of 12 to 15 feet below grade. The sampling process was found to be very time consuming taking approximately 45 minutes to retrieve from the trench into the sample bucket. The slump and unit weight of the material were 81/4 inches and 130.8 pcf, respectively. A sample was shipped overnight to our office in Plymouth, Michigan for determination of moisture content and permeability. The second sample near station 5+95 will be obtained first thing tomorrow morning. The sample was not obtained today due to time constraints associated with shipping the first sample.

The contractor constructed a 30 linear feet probe from ½ inch diameter copper pipe. Attempts to probe the bottom of the trench with this probe failed due to the flexibility of the copper pipe. The contractor obtained some new larger diameter galvanized pipe to construct the probe. The probe will be ready for use tomorrow.

Work will resume at 7:30 AM tomorrow.

FIELD REPRESENTATIVE: SHB REVIEWED BY: [signature]

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 01/23/01
CLIENT: Contract Dewatering Services
WEATHER: Sunny 34F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 15
CLIENT'S REPRESENTATIVE(S): Mr. John Flak
CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0.4 ppm.

In general, all work was performed from the up wind side of the trench.

On arrival at the site, it was noted that the trenching machine was repaired and in working order Trenching operations began at 8:30 AM at station 6+65. The top of clay at station 6+65 was at elevation 619.48. The boom arm was lowered approximately 2 feet (bottom trench elevation 617.46) and the trenching machine walked forward. As the trenching machine walked forward, the operator felt that he was trenching more than 2 feet of the clay. The top of the clay was determined at station 6+80 to be at elevation 624.42. The boom arm was lowered approximately 2 feet (bottom trench elevation 622.25) and the trench machine was walked forward to station 6+82 (approximately 3 feet from existing

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FIELD REPRESENTATIVE: SHB

REVIEWED BY: BR

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/19/01
PROJECT NO.:	**00192-011**	WEATHER:	Snow 26F
LOCATION:	**Griffith, Indiana**	REPORT NO:	14a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Barry Medford
Contractor's representative: Barry Medford

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
Background	8:30	0	0	0	
6+82	9:00	0	0	0	
6+82	9:30	0	0	0	
	10:00				
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 14

PROJECT NO.: 00192-011 | DATE: 01/19/00 | SHEET 2 OF2

PROGRESS OF WORK:

It was also noted that the liner was not installed straight up and down and appeared to encroach on the trench. The contractor decided to stop trenching, and remove the trencher, have Montgomery Watson personnel inspect the trench and then backfill the trench with spoils. When the trencher was removed from the excavation it was noted that the chain was hanging loose. Further investigation revealed that the upper sprocket had been sheared into 2 pieces.

The contractor informed me that a new sprocket would be ordered from the manufacturer and installed on Monday of next week. Trenching should begin on Tuesday of next week.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: DJV

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 01/19/01

CLIENT: Contract Dewatering Services
WEATHER: Snow 26F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 14

CLIENT'S REPRESENTATIVE(S): Mr. John Flak/ Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak/ Barry Medford

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0ppm.

Prior to construction, I laid out the sampling and depth verification intervals by marking the ground with paint along the SBW alignment. The length of the boom arm was measured from the tip of the cutters to the bottom of the contractors ruler attached to the boom arm for elevation readings. This measurement was 27 feet even. The width of the cutters was measured at 2 feet.

At 9:00 AM the contractor set up the trencher parallel and west of the perimeter wall at the east end of the SBW alignment. The contractor trenched down approximately 5 feet and stopped to inspect the progress. It was noted that the 60-mil HDPE liner of the perimeter wall was exposed and any soil and/or slurry had caved into the trench, away from the liner.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: [illegible]

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/17101
PROJECT NO.:	**00192-011**	WEATHER:	P. Sunny 28F
LOCATION:	**Griffith, Indiana**	REPORT NO:	13a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
6+90	8:30	0	0	0	Expose utility lines
6+90	9:00	0	0	0	further north at
6+90	9:30	0	0	0	east end of SBW
6+90	10:00	0	0	0	alignment
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
	13:00				
	13:30				
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 13

PROJECT NO.: 00192-011 DATE: 01/18/00 SHEET 2 OF2

PROGRESS OF WORK:

mid depth of the trench.

Montgomery Watson's project manager, Todd Lewis, was on-site today and expressed concern about the top of the clay layer elevation at the east end of the SBW alignment. Mr. Lewis is concerned that the contractor may penetrate through the clay layer while trenching, since the clay layer is only 5 feet thick in some areas of the site.

The contractor will determine the top of the clay layer at the east end of the alignment by slowly lowering the boom arm until it brings up clay cuttings. The contractor will then key the wall 2 feet into the clay layer.

FIELD REPRESENTATIVE: SHB REVIEWED BY: QQV

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site	PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana	DATE: 01/18/01
CLIENT: Contract Dewatering Services	WEATHER: Partly Sunny, 28F
CONTRACTOR(S): Contract Dewatering Services	SHEET 1 OF 2
	REPORT NO.: 13

CLIENT'S REPRESENTATIVE(S): Mr. John Flak/ Barry Medford

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak/ Barry Medford

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0ppm.

The contractor finished preparing the trenching machine. The chain was tightened and cutting teeth attached.

The utilities lines exposed yesterday near the east end of the SBW alignment were excavated and pulled up another 10 feet to the north. This was done to prevent damage to the lines when the trencher installs the portion of the SBW parallel to the perimeter wall.

The testing lab was unable to determine the slump range for the mix design today and Montgomery Watson would not allow installation of the SBW to begin. Montgomery Watson also stated that the installation could not start until the contractor had a sampling device on site. The proposed sampling device should be capable of obtaining a sample at

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FIELD REPRESENTATIVE: SHB REVIEWED BY: CRB

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/17101
PROJECT NO.:	**00192-011**	WEATHER:	Cloudy 28F
LOCATION:	**Griffith, Indiana**	REPORT NO:	12a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
	10:00				
	10:30				
6+80 start	11:00	0	0	0	Locating existing
6+80	11:30	0	0	0	SBW east end
6+80	12:00	0	0	0	"
Lunch	12:30				
6+80	13:00	0	0	0	Locating Utilities
6+60	13:30	0	0	0	east end
6+60	14:00	0	0	0	"
6+80	14:30	0	0	0	"
0+00	15:00	0	0	0	Locating Utilities
0+10	15:30	0.2	0.2	0.2	west end
0+05	16:00	0.4	0.2	0	"
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 12

PROJECT NO.: 00192-011 | DATE: 01/17/00 | SHEET 2 OF3

PROGRESS OF WORK:

quickly dissipated. The HNU registered a momentary reading of 0.4 ppm at the ground surface and subsequently fell to 0.2 ppm.

The contractor also prepared the trenching machine by adding the extension to the boom arm and attaching the chain to the boom arm.

Barry Medford of Contract Dewatering Services had his OSHA physical today at a local clinic.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB | REVIEWED BY: OK

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 12

PROJECT NO.: 00192-011 | DATE: 01/17/00 | SHEET 2 OF3

PROGRESS OF WORK:

design.

The contractor located the existing perimeter soil-bentonite slurry wall with the 60-mil HDPE liner at the east end of the proposed SBW alignment. The excavator exposed the HDPE line approximately 3 feet below grade by scratching the ground 6 inches at a time with the bucket teeth.

Further excavation west of the perimeter wall exposed the ½ inch and 2 inch diameter HDPE air and water lines approximately 6 feet below grade. These lines were not in service, as Montgomery Watson personnel had shut down the pumping system earlier in the day. The contractor cut the lines with the excavator bucket and exposed approximately 15 linear feet of the lines. The lines were then bent up to extend above the ground surface. The excavation was then backfilled with spoils.

The contractor then moved to the west end of the SBW alignment to locate the ½ inch, 2 inch, and 4 inch HDPE lines at that location. The air, water, and future use lines were exposed approximately 4 feet below grade. The air and water lines were cut with the excavator bucket and bent up to extend above the ground surface similar to the other lines. The 4 inch diameter future use line, which extends under the railroad tracks, only extended approximately 8 feet beyond the SBW alignment. Approximately 12 feet of the 4 inch line was removed. The excavation was then backfilled with spoils. It should be noted that a short piece of old corrugated steel culvert was encountered while exposing these lines. In addition, when the 2 inch water line was cut, a strong petroleum based odor was encountered and

FIELD REPRESENTATIVE: SHB | REVIEWED BY: ORJ

HANSON
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Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 01/17/01
CLIENT: Contract Dewatering Services
WEATHER: Cloudy, 28F
CONTRACTOR(S): Contract Dewatering Services

REPORT NO.: 12
CLIENT'S REPRESENTATIVE(S): Mr. John Flak/ Barry Medford
CONTRACTOR'S REPRESENTATIVE: Mr. John Flak/ Barry Medord

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2eV lamp. Air monitoring was performed at approximately 30 intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOC's above 0.4 ppm.

On arrival at site I counted the super bags of Wyo-Ben Hydrogel bentonite and noted that 22 super bags at 2800 lbs each had been delivered since I left the site last Thursday (January 11, 2001). That makes a total of 27 super bags left on-site.

The contractor delivered the larger, self leveling trenching machine, boom arm extension and chain to the site yesterday afternoon. First thing this morning the broken trenching machine was loaded on the low boy and hauled off-site.

I pulled 1-5 gallon bucket sample of the Wyo-Ben Hydrogel and 2-5 gallon bucket samples of sand from the SBW alignment. These samples were sent to NTH Consultants in Farmington Hills, Michigan to determine the slump range for the soil-bentonite slurry mix

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FIELD REPRESENTATIVE: SHB REVIEWED BY: ERW

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 11

PROJECT NO.: 00192-011 | DATE: 01/11/00 | SHEET 2 OF2

PROGRESS OF WORK:

Michigan and then shipped to job site is attached.

Work will resume once the SBW mix design has been approved.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: BRV

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011
LOCATION: Griffith, Indiana
DATE: 01/11/01
CLIENT: Contract Dewatering Services
WEATHER: Sunny, 40F
CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2
REPORT NO.: 11

CLIENT'S REPRESENTATIVE(S): Mr. John Flak
CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe the placement of bentonite Hydrogel in the starter trench. Air monitoring was not required because no excavation work was performed.

The contractor placed approximately 2800 libs of Hydrogel for every 20 linear feet of starter trench, or 140 lbs of Hydrogel for every foot of starter trench.

The contractor received 17 super bags with 2800 lbs per bag this morning, for a total of 37 super bags on-site. A total of 32 super bags were emptied in the starter trench for a total of 89,600 lbs of bentonite Hydrogel placed.

The ground surface elevations were obtained at approximately 100 foot intervals along the alignment at the approximate location of CDS soil borings. Based upon CDS borings and average ground surface elevations, the clay layer elevation varies from elevation 617 at station 0+10, elevation 619.5 at station 3+10, and elevation 616 at station 6+10. This corresponds to trencher installation depths ranging from 22 feet to 26 feet, including the 2 feet key into the clay layer. See attached sketch and CDS boring information.
Also, a copy of the shipping invoice for the Wyo-Ben Hydrogel shipped to CDS yard in

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FIELD REPRESENTATIVE: SHB

REVIEWED BY: [signature]

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/10/01
PROJECT NO.:	**00192-011**	WEATHER:	Sunny, Windy 37F
LOCATION:	**Griffith, Indiana**	REPORT NO:	10a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
Calibration	8:00	0	0	0	
	8:30				
	9:00				
	9:30				
	10:00				
STA 5+00	10:30	0	0	0	
STA 4+00	11:00	0	0	0	
STA 3+00	11:30	0	0	0	
STA 3+50	12:00	0	0	0	
Lunch	12:30	-	-	-	
STA 2+00	13:00	0	0	0	
STA 1+00	13:30	0	0	0	
STA 0+50	14:00	0	0	0	
STA 0+00	14:30	0	0	0	
	15:00	-	-	-	
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 10

PROJECT NO.: 00192-011 DATE: 01/10/00 SHEET 2 OF2

PROGRESS OF WORK:

ground surface. No damage was done to the perimeter SBW.

According to Montgomery Watson personnel at the site, the 60 mil HDPE liner may not extend to the ground surface at this location.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY: BK

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DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 01/10/01

CLIENT: Contract Dewatering Services

WEATHER: Sunny, Windy 37F

CONTRACTOR(S): Contract Dewatering Services

SHEET 1 OF 2

REPORT NO.: 10

CLIENT'S REPRESENTATIVE(S): Mr. John Flak

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a PE-Photovac PID with a 11.7 eV lamp. Air monitoring was performed at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOCs above 0 ppm.

The contractor continued excavation of the starter trench located 30 feet south of the southern most railroad track. The starter trench is approximately 4 feet wide at the top and 3 feet wide at the bottom of the trench with the depth varying from 2 to 3 feet. Trench depth of less than 3 feet corresponds with areas of caving surface soils. Trench soils consisted of approximately 1 foot of gravelly cinder fill underlain by native silty fine sand. Approximately 550 linear feet of trench was excavated.

The contractor located the existing slurry wall at the west end of the SBW alignment by scratching through the snow with the excavator bucket. However the exact location at the east end of the alignment has not been located. The 60 mil HDPE liner was exposed at the

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FIELD REPRESENTATIVE: SHB

REVIEWED BY: [signature]

Barrier Wall Starter Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	1/9/01
PROJECT NO.:	**00192-011**	WEATHER:	Sunny, 30F
LOCATION:	**Griffith, Indiana**	REPORT NO:	9a
CLIENT:	Contract Dewatering Services	SHEET 1 OF 1	
CONTRACTORS:	Contract Dewatering Services		

Client's representative: John Flak
Contractor's representative: John Flak

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
	8:00				
	8:30				
	9:00				
	9:30				
	10:00				
	10:30				
	11:00				
	11:30				
	12:00				
	12:30				
	13:00				
PE-Photovac PID	13:30	0	0	0	
~STA 7+00	14:00	0	0	0	
STA 6+50	14:30	0	0	0	
STA 6+00	15:00	0	0	0	
STA 5+50	15:30	0	0	0	
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 9

PROJECT NO.: 00192-011 DATE: 01/09/00 SHEET 2 OF2

PROGRESS OF WORK:

with the depth varying from 2 to 3 feet. Approximately 150 feet of the starter trench was excavated on today's date. Trench soils consisted of approximately 1 foot of gravelly cinder fill underlain by native silty fine sand.

The contractor received 20 super bags of Wyo-Ben Hydrogel from their yard in Michigan. Each super bag weights approximately 2800 lbs. In addition, the broken trencher chain was sent back to the contractor's shop in Michigan for repairs.

According to the contractor, the shop is already building a new stronger chain in hopes that it can trench through the buried metal debris with less damage.

I transported the HNU to the supplier and repairs and re-calibration were performed today.

Work will resume tomorrow at 7:30 AM.

FIELD REPRESENTATIVE: SHB REVIEWED BY: BRV

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DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana | DATE: 01/09/01

CLIENT: Contract Dewatering Services | WEATHER: Sunny, 30F

CONTRACTOR(S): Contract Dewatering Services | SHEET 1 OF 2

REPORT NO.: 9

CLIENT'S REPRESENTATIVE(S): Mr. John Flak

CONTRACTOR'S REPRESENTATIVE: Mr. John Flak

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earth work operations and perform air monitoring. Air monitoring was performed with a PE-Photovac PID with a 11.7 eV lamp. Air monitoring was performed at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not detect any VOCs above 0 ppm. The PE-Photovac was used after the HNU PID developed a short in the lamp cord during background readings.

Based on discussion between Montgomery Watson (Todd Lewis) and Contract Dewatering (John Flak) the SBW layout was changed to 30 feet south of the southern most railroad track. Layout was performed by measuring 30 feet south of the southern most rail of the railroad track.

The contractor removed snow and stock piled sand from the separation barrier wall alignment and began trenching the east end of the starter trench. The starter trench is approximately 4 feet wide at the top of the trench and 3 feet wide at the bottom of the trench

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FIELD REPRESENTATIVE: SHB

REVIEWED BY: SK

Extraction Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT:	**ACS Clean-up Site**	DATE:	12/30/00
PROJECT NO.:	**00192-011**	WEATHER:	Snow, 20F
LOCATION:	**Griffith, Indiana**	REPORT NO:	8b
CLIENT:	Contract Dewatering Services	SHEET 1 OF	2
CONTRACTORS:	Contract Dewatering Services		

Client's representative: Dick Nuemann
Contractor's representative: Dick Neumann

	Location		Depth of Trench (ft.)	Ground Surface Elev.	Bottom of Trench Elev.
	Extraction Well No.	Coordinate System			
Proposed	EW-20	N 6512.6 E 5256.3	15.00	635.00	620.00
Actual			16.63	636.50	619.87
Proposed	EW-20a	N 6471.8 E 5345.0	13.00	636.00	623.00
Actual					
Proposed	EW-20b	N 6430.7 E 5434.4	13.00	636.00	623.00
Actual					
Proposed	EW-20c	N 6391.9 E 5518.8	13.00	636.00	623.00
Actual					
Proposed	CO	N 6355.6 E 5598.1	0.00		
Actual					

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PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 12/30/00
WEATHER: Snow, 20F
REPORT NO: 8a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
EW-20	7:30	0	0	0	Calibrate machine
	8:00	0	0	0	
	8:30	0	0	0	
	9:00	0	0	0	
0+00	9:30	0	0	0	
0+05	10:00	0	0	0	
0+10	10:30	0	0	0	
0+20	11:00	0	0	0	Machine break down
	11:30	0	0	0	chain fell off
Lunch	12:00				
"	12:30				
	13:00				
	13:30	0	0	0	End of Monitoring
	14:00				
	14:30				
	15:00				
	15:30				
	16:00				
	16:30				
	17:00				
	17:30				

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site REPORT NO.: 8

PROJECT NO.: 00192-011 DATE: 12/30/00 SHEET 2 OF2

PROGRESS OF WORK:

began raising the boom out of the ground, the chain on the trencher broke in half on what was apparently buried metal debris. EW-20 was removed from the ground, however, the bottom of the screen broke off below the ground surface. The trench was back filled with spoils. Trencher will be staged on site until the second trencher arrives to construct the barrier wall. The trencher was readied for transportation by removing the laser level equipment, tile feed, and sand hopper assembly from the boom arm. Work will likely resume the week of January 8, 2001.

FIELD REPRESENTATIVE: SHB REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site — PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana — DATE: 12/30/00

CLIENT: Contract Dewatering Services — WEATHER: Snow, 20F

CONTRACTOR(S): Contract Dewatering Services — SHEET 1 OF 2

REPORT NO.: 8

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe trenching operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2 eV lamp. Air monitoring was performed at approximately 30 minute intervals during trenching operations. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings did not pick up any VOCs (PID less than or equal to 0 ppm).

After running heaters all night, the tracks on the trenching machine broke free of the ground. Trenching operations were delayed until approximately 10:00 AM due to a frozen water valve on the boot assembly. Once the valve was repaired, the extraction well, EW-20 was set at elevation 619.87 and the machine began trenching away from the well. Metal debris hampered trenching operation and broke several teeth off the trenching chain. While trenching the first 10 feet it was noted that the drain tile was not feeding at the trenching rate. Another 10 feet of trenching was attempted with no drain tile feed. At this time the operator

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FIELD REPRESENTATIVE: SHB — REVIEWED BY:

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 12/29/00
WEATHER: Snow, 18F
REPORT NO: 7a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)			Remarks
		G.S.	5 ft.	10 ft.	
	7:30				
EW-20	8:00	0	0	0	Reparing Equipment
	8:30	0	0	0	
	9:00				
	9:30	0	0	0	
	10:00				
	10:30	0	0	0	
	11:00				
	11:30	0	0	0	
	12:00				Lunch
	12:30				"
	13:00	0	0	0	
	13:30	0	0	0	
	14:00	0	0	0	
	14:30	0	0	0	
	15:00	0	0	0	
	15:30				
	16:00				
	16:30				
	17:00				
Off-site	17:30	0	0	0	

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana

DATE: 12/29/00

CLIENT: Contract Dewatering Services

WEATHER: Snow, 18F

CONTRACTOR(S): Contract Dewatering Services

SHEET 1 OF 1

REPORT NO.: 7

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earthwork operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2 eV lamp. Air monitoring was performed at approximately 30 minute intervals during earth work operations. Air reading during equipment repairs were performed as a worker precaution. Air monitoring was performed at ground surface elevation and at approximately 5 and 10 feet above the ground surface, simulating worker breathing zones. Air monitoring readings were zero (PID less than or equal to 0ppm).

No trenching operations were performed today. The main hydraulic pump was replaced and the control cable adjusted. The trencher tracks were frozen to the ground, repeated attempts at moving the machine only succeeded in blowing a hydraulic hose fitting. The hydraulic hose and fitting were repaired and kerosene heaters and tarps were used to heat up the tracks. The heaters were kept running all night.

Work will begin tomorrow at 7:00 AM.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: BH

Extraction Trench Installation

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 12/28/00
WEATHER: Cold,20F
REPORT NO: 6a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)		
		G.S.	5 ft.	10 ft.
EW-20	7:30	0	0	0
No Trenching	8:00	0	0	0
Activities	8:30	0	0	0
	9:00	0	0	0
	9:30	0	0	0
Off-Site	10:00			
No work on site	10:30			
"	11:00			
"	11:30			
"	12:00			
"	12:30			
	13:00			
	13:30			
	14:00	0	0	0
Off-Site	14:30			
	15:00			
	15:30			
	16:00			
	16:30			
	17;00			
	17:30			

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 12/28/00

CLIENT: Contract Dewatering Services
WEATHER: Cold, 20F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 1

REPORT NO.: 6

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe earthwork operations and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2 eV lamp. Air monitoring was performed at approximately 30 minute intervals during earth work operations. It should be noted that no trenching operations were performed on today's date, so air readings are a precaution for workers performing repairs. Air monitoring was performed at ground surface, 5 feet and 10 feet above ground surface, simulating worker breathing zones. No readings were recorded greater than zero parts per million (ppm).

No trenching was performed, however approximately 5 truck loads of sand were delivered on-site. Work activities will resume at 7:30 AM on Friday, December 29, 2000.

The contractor removed the broken hydraulic pump from the trencher and transported it to a repair shop in Michigan. When the hydraulic hose blew it also damaged the trencher control cable. A new control cable was delivered and installed today.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: [signature]

Extraction Trench Installation

HANSON ENGINEERING P.C.
Soils, Foundations & Underground Specialists

PROJECT: **ACS Clean-up Site**
PROJECT NO.: **00192-011**
LOCATION: **Griffith, Indiana**
CLIENT: Contract Dewatering Services
CONTRACTORS: Contract Dewatering Services

DATE: 12/27/00
WEATHER: Cold 20 F
REPORT NO: 5a
SHEET 1 OF 1

Client's representative: Richard Neumann
Contractor's representative: Richard Neumann

Location	Time	PID Readings (ppm)		
		G.S.	5 ft.	10 ft.
EW-20	7:30			
	8:00			
	8:30			
	9:00			
Start Trenching	9:30	0	0	0
	10:00	0	0	0
	10:30	0	0	0
	11:00	0	0	0
	11:30	0	0	0
	12:00	0	0	0
Lunch	12:30	na	na	na
	13:00	0	0	0
	13:30	0	0	0
	14:00	0.2	0.2	0
	14:30	0.2	0.2	0
	15:00	0.2	0.2	0
	15:30	0.3	0.2	0
End of Work Day	16:00	0.2	0.1	0
	16:30			
	17:00			
	17:30			

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | REPORT NO.: 5

PROJECT NO.: 00192-011 | DATE: 12/27/00 | SHEET 2 OF2

PROGRESS OF WORK:

Repairs were undertaken and continued through the remainder of the work day. Seven truck loads of sands were delivered on site today. Approximately one truck load of sand (20 tons) was used to backfill the trencher excavation made while trenching from the ground surface to perpendicular at EW-20.

The contractor removed wet spoils from between the trencher tracks and around the boom arm to prevent the machine from freezing to the ground.

Work activities will resume at 7:30 am Thursday, December 28, 2000.

FIELD REPRESENTATIVE: SHB | REVIEWED BY: ØV

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 12/27/00

CLIENT: Contract Dewatering Services
WEATHER: Light Snow, 20F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 2

REPORT NO.: 5

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe extraction well trench installation and perform air monitoring. Air monitoring was performed with an HNU PID with a 10.2 eV lamp. Air monitoring was performed at approximately 30 minute intervals during construction activities. Additionally, air monitoring was performed at the ground surface, 5 feet above the ground surface and at equipment cab elevations approximately 10 feet above ground surface. The HNU PID did not register any readings greater than 0.3 ppm. See attached table for more information.

At approximately 9:15 AM, the contractor began trenching the boom arm below grade. The trench was filled with water obtained from a nearby fire hydrant and the boom arm straightened perpendicular to the ground surface. The elevation at the bottom of the trench was measured with the drain invert elevation 619.5. This is 6 inches low and will be raised to elevation 620.0. When raising the drain invert elevation to 620.0, one of the main hydraulic cylinders of the trenching machine broke down. The hydraulic cylinder is responsible for raising and lowering the boom arm.

FIELD REPRESENTATIVE: SHB
REVIEWED BY: [signature]

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 12/26/00

CLIENT: Contract Dewatering Services
WEATHER: Cold 18 F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 1

REPORT NO.: 4

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived on-site to observe earthwork operations and perform air monitoring with a HNU PID with 10.2 V lamp. The contractor laid out approximately 440 linear feet of the 6" diameter HDPE drain tile and set up the trenching machine for Extraction Trench No. 20. The location of EW-20 was laid out by Jomo Reynolds of Montgomery Watson with a GPS system. The contractor removed approximately 30 linear feet of frost, approximately 18 to 24 inches thick, directly west of EW-20. No vocs were detected during air monitoring.

The drain tile was attached to well screen mounted on the trencher boom arm. Based on field measurements the boom arm is approximately 23 feet, 2 inches from the tile invert to a steel angle located on the back side of hopper. The steel angle will be used for determining elevations of the pipe invert.

Work activities will continue on Wednesday, December 27 at 7:30 a.m.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: DRH

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site		REPORT NO.: 3
PROJECT NO.:00192-011	DATE: 12/22/00	SHEET 2 OF 2

PROGRESS OF WORK:

the area will be benched and open cut in accordance with OSHA recommendations.

Mr. Neumann has received approval to offset EW-19 from the planned location if the PCB contaminated soils are impacted by the open cut. Three truck loads of sand were delivered on site today, equivalent to 60 tons of material.

Work activities will continue on Tuesday, December 26, 2000 at 8:00 a.m.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: DRB

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site | PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana | DATE: 12/22/00

CLIENT: Contract Dewatering Services | WEATHER: Cold, Sunny 10 F
WC -26 to -40 F

CONTRACTOR(S): Contract Dewatering Services | SHEET 1 OF 1

REPORT NO.: 3

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived on-site to observe earthwork operations and perform air monitoring. Prior to commencing earthwork operations, Montgomery Watson personnel reviewed site conditions with field personnel. Earthwork operations consisted of moving stockpiled dirt back from proposed extraction well trench No. 20. Based on visual observations and existing site conditions noted by MW, a stock pile of dirt, located within 10 feet of EW-19 trench line, is contaminated with PCB's. According to MW personnel the stock pile is covered with visquine.

Air monitoring was performed in worker breathing zones with a HNU PID with a 10.2eV lamp to check for voc vapors during earthwork operations. The HNU detector did not detect any vocs during air monitoring.

According to Mr. Neumann, construction of EW-19 will require approximately 8 to 10 feet of down cutting prior to trenching activities. Since no shoring or sheeting is planned,

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FIELD REPRESENTATIVE: SHB | REVIEWED BY: DA[illegible]

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site

LOCATION: Griffith, Indiana

CLIENT: Contract Dewatering Services

CONTRACTOR(S): Contract Dewatering Services

PROJECT NO.: 00192-011

DATE: 12/21/00

WEATHER: Cold 10 F, WC -25 F

SHEET 1 OF 1

REPORT NO.: 2

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe installation of extraction trenches. Prior to commencing any construction activities, the three current workers on-site, Dick Neumann, and myself were respirator fit tested. Fit testing was performed by Mr. Neumann in accordance with NIOSH standards. All five of us passed the fit test.

No earth work was performed on today's date. Work activities will continue on Friday, December 22, 2000 at 7:00 a.m.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: BRH

HANSON
ENGINEERING P.C.
Soils, Foundations & Underground Specialists

DAILY FIELD REPORT

PROJECT: ACS Clean-up Site
PROJECT NO.: 00192-011

LOCATION: Griffith, Indiana
DATE: 12/20/00

CLIENT: Contract Dewatering Services
WEATHER: Cold 13 F

CONTRACTOR(S): Contract Dewatering Services
SHEET 1 OF 1

REPORT NO.: 1

CLIENT'S REPRESENTATIVE(S): Dick Neumann

CONTRACTOR'S REPRESENTATIVE: Dick Neumann

PROGRESS OF WORK:

On today's date, this writer arrived at the above referenced job site to observe installation of extraction trenches. Construction activities included ordering of air monitoring equipment (HNU PID with 10.2 V lamp and Draeger Tubes for detection of Benzene) and transferring benchmarks to construction areas. In addition, ground surface elevations were obtained at EW-19, CO-19 (clean out), EW-20, CO-20, and along E. end of proposed slurry wall alignment.

Based on ground surface elevations, EW-20 trench will be approximately 1.5 feet deeper than noted on drawing C-4, dated 9/7/00 changes to request for proposal. It should be noted that the clay cap has already been pulled off the trench line thus indicating that the trench was actually greater than 1.5 ft. deeper. Work activities will continue on Thursday, December 21 at 7:30 a.m.

FIELD REPRESENTATIVE: SHB

REVIEWED BY: DRB

APPENDIX E

Photograph Log
(Photographs provided by Hanson Engineering and KES)

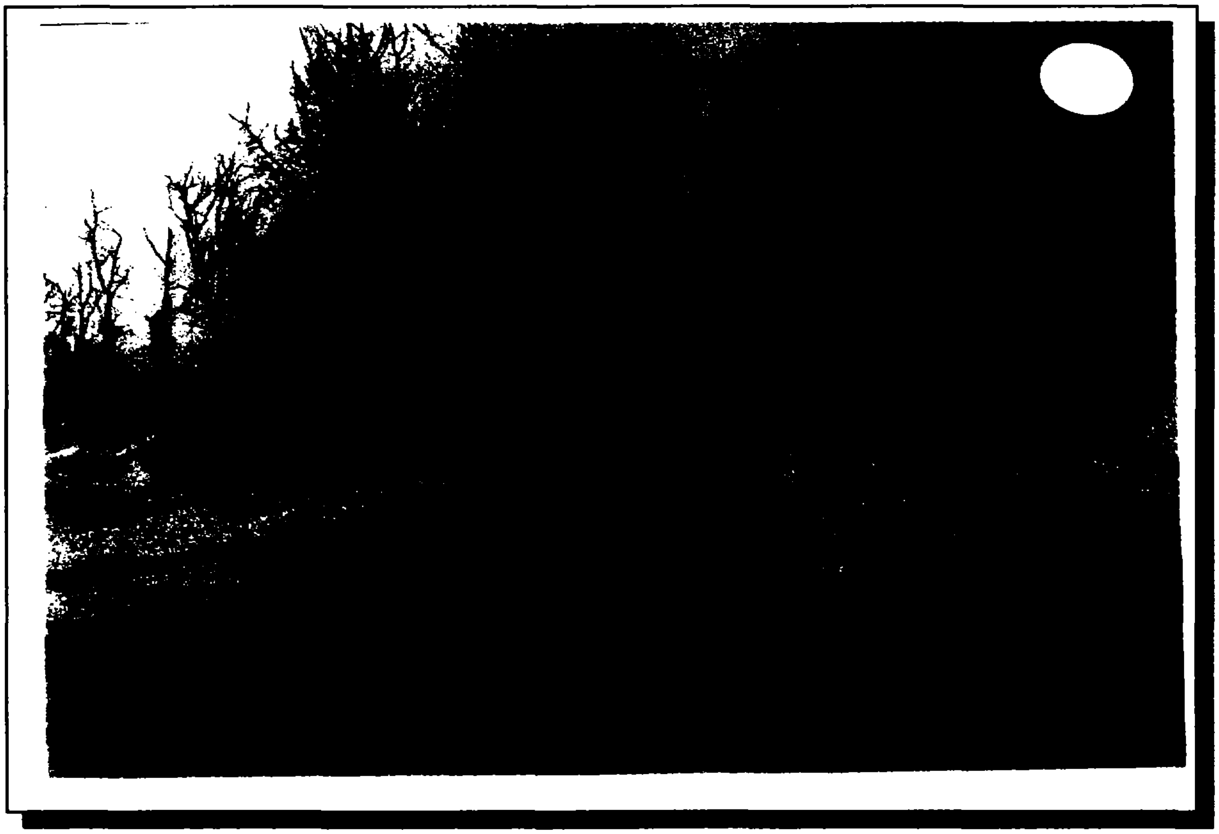
PHOTOGRAPH LOG
BARRIER WALL EXTRACTION SYSTEM:
OFF-SITE AREA UPGRADES
CONSTRUCTION COMPLETION REPORT

PHOTO NO.	DATE	CONTRACTOR	DESCRIPTION
1	12/23/00	CDS	Looking west at pre-cut along EW-20 alignment
2	12/23/00	CDS	Looking west at pre-cut along EW-20 alignment
3	12/26/00	CDS	Looking west along pre-cut with 6-inch HDPE perforated drain tile with sock laid along alignment
4	12/26/00	CDS	Positioning trencher at EW-20
5	12/26/00	CDS	Looking west along pre-cut with paint marks laid out at 20-foot intervals
6	12/26/00	CDS	Excavator operator
7	12/26/00	CDS	Attaching 6-inch HDPE to EW-20
8	12/26/00	CDS	EW-20 in position along outside edge of boom arm
9	12/26/00	CDS	Trencher boom arm and chain
10	12/26/00	CDS	Trenching into ground to set EW-20
11	12/27/00	CDS	Trencher set up at EW-20, but not operating
12	12/27/00	CDS	Trencher at EW-20 with clean sand backfill along trench
13	12/27/00	CDS	6-inch HDPE perforated drain tile along side trencher
14	12/27/00	CDS	Laser level setup to guide trencher boom arm
15	12/30/00	CDS	Trencher with no chain on boom arm during repair
16	12/30/00	CDS	Piece of steel pipe brought up out of ground by trencher chain prior to chain breaking
17	12/30/00	CDS	Backfilled abandoned trench
18	12/30/00	CDS	EW-20 well casing set in ground (Note: bottom of well screen broke off during retrieval)
19	12/30/00	CDS	Close up photo of broken well screen from EW-20
20	12/30/00	CDS	Broken trencher chain laid out along pre-cut for EW-20
21	12/30/00	CDS	6-inch HDPE pinched off, still on boot assembly
22	2/2/01	CDS	Looking west along EW-20 alignment (Note: frozen water at far half of run)
23	2/8/01	CDS	Excavator breaking up ice and removing mud along alignment
24	2/8/01	CDS	Looking west at ice and mud along pre-cut for EW-20
25	2/8/01	CDS	Trenching machine with new extraction well EW-20 and 6-inch HDPE pipe with filter sock set up on boom arm
26	2/8/01	CDS	Close up of 6-inch HDPE attached to extraction well
27	2/8/01	CDS	Trenching down at EW-20 location (Location off set to miss bottom of screen left below grade during first installation attempt)
28	2/8/01	CDS	Trenching away from EW-20 (90° pipe above water)
29	2/11/01	CDS	Trench back in place to install EW-20 again (3rd try)
30	2/12/01	CDS	Excavator placing sand in hopper and directly in trench behind trench
31	2/20/01	CDS	Trencher installing interceptor drain 20 (looking west)
32	2/20/01	CDS	Manholes set at intermediate and end wel locations along EW-20 (Note: well points laying on ground surface)
33	2/20/01	CDS	Installing header system for well points at location of drain tile lost below ground surface during installation of EW-20
34	2/20/01	CDS	Header system laid out and pump set up to install well points (Excavator breaking out frost in area of well points)
35	2/19/01	CDS	Excavating 10 foot pre-cut required to install system at correct depth (Looking south along EW-19 alignment)
36	2/19/01	CDS	Debris found in clay cap material during pre-cut

PHOTO NO.	DATE	CONTRACTOR	DESCRIPTION
37	2/19/01	CDS	Additional debris found between clay cap and native sands
38	2/20/01	CDS	Excavator with metal debris in excavator bucket
39	2/20/01	CDS	Old refrigerator and debris removed from excavation of pre-cut (Layer of debris between clay cap and native sands thicker as excavator moved south)
40	2/20/01	CDS	Pile of native sand with debris removed from EW-19 pre-cut
41	2/20/01	CDS	Looking north along pre-cut for EW-19
42	2/20/01	CDS	Water heater removed at south end of EW-19 pre-cut
43	2/21/01	CDS	Kitchen sink removed at south end of EW-19 pre-cut
44	2/21/01	CDS	Looking north down ramp into EW-19 pre-cut
45	2/21/01	CDS	Pile of debris removed from EW-19 pre-cut
46	2/23/01	CDS	Trenching machine stuck in trench coming out of pre-cut
47	2/23/01	CDS	Attempting to extract trencher
48	2/23/01	CDS	Attempting to extract trencher
49	NA	KES	Pipes penetrating barrier wall HDPE liner
50	2/14/01	KES	Two-inch diameter pipes penetrating barrier wall HDPE liner
51	NA	KES	Pipe #9 (1-in. dia.) and Pipe #2 (2-in. dia.) tied into existing on-site piping
52	2/28/01	KES	Bentonite backfill at separation barrier wall penetration
53	2/16/01	KES	Installation of 8-in. dia. pipes running to future Off-Site Area blower shed and 1-in. dia. line running to EW-11
54	2/16/01	KES	Two-inch diameter pipes in trench
55	2/20/01	KES	Piping installed under railroad tracks
56	2/20/01	KES	Finished layer of rock before tracks were reinstalled
57	3/7/01	KES	Typical entry into manhole with 2 pipes (EW-12 and EW-13A)
58	3/8/01	KES	Typical entry into manholes (EW-19, EW-19A, EW-20, EW-20A, EW-20B, and EW-20C)
59	3/16/01	KES	Typical well manhole (EW-13A, EW-19, EW-19A, EW-20, EW-20A, EW-20B, EW-20C)
60	3/16/01	KES	Typical well manhole (EW-13A, EW-20, EW-19, EW-19A, EW-20A, EW-20B, and EW-20C)
61	3/16/01	KES	Typical finished well (EW-13A, EW-19, EW-19A, EW-20, EW-20A, EW-20B, EW-20C)
62	3/15/01	KES	Pipes daylighting at location of future Off-Site Area ISVE blower shed (Pipes #8, #14, #15, #16, #17)
63	7/2001	CDC	Influent header manifold in GWTP

PHOTOGRAPH 1

PHOTOGRAPH 2



PHOTOGRAPH 3

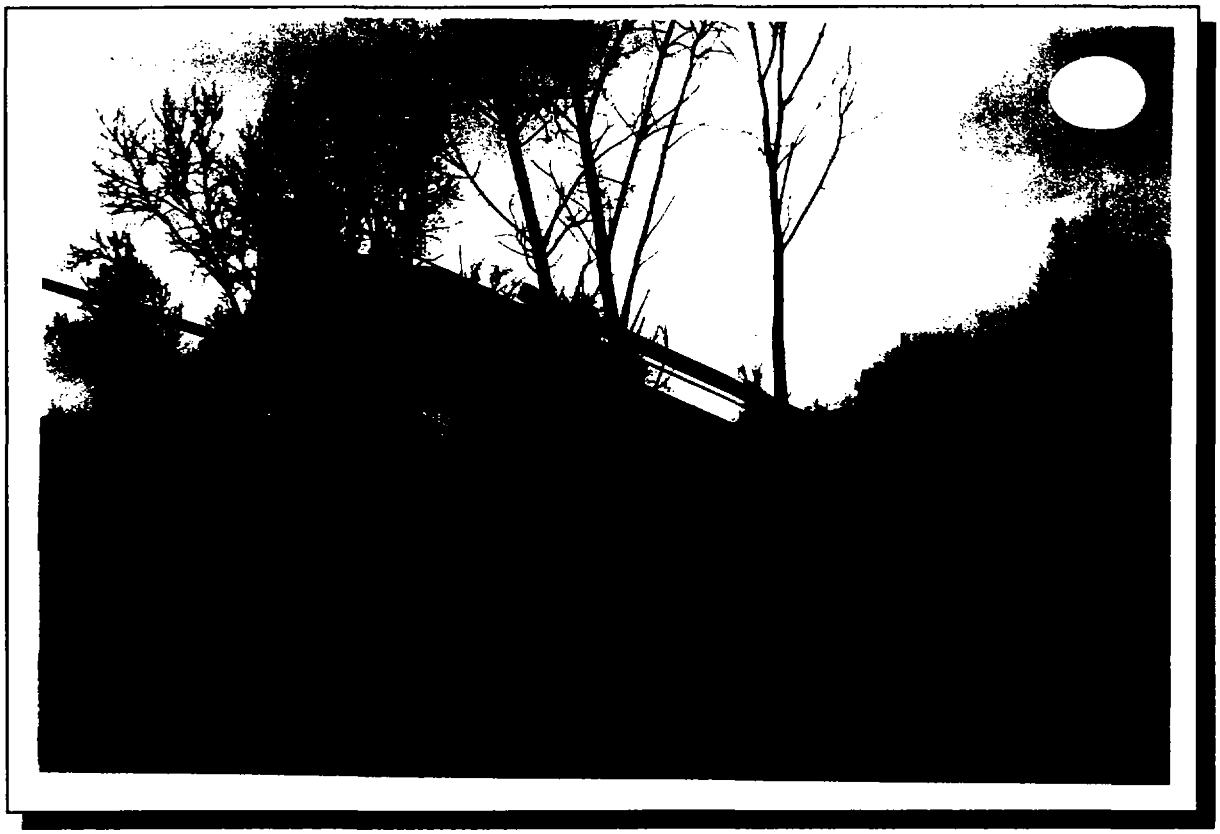
PHOTOGRAPH 4

PHOTOGRAPH 5

PHOTOGRAPH 6

PHOTOGRAPH 7

PHOTOGRAPH 8



PHOTOGRAPH 9

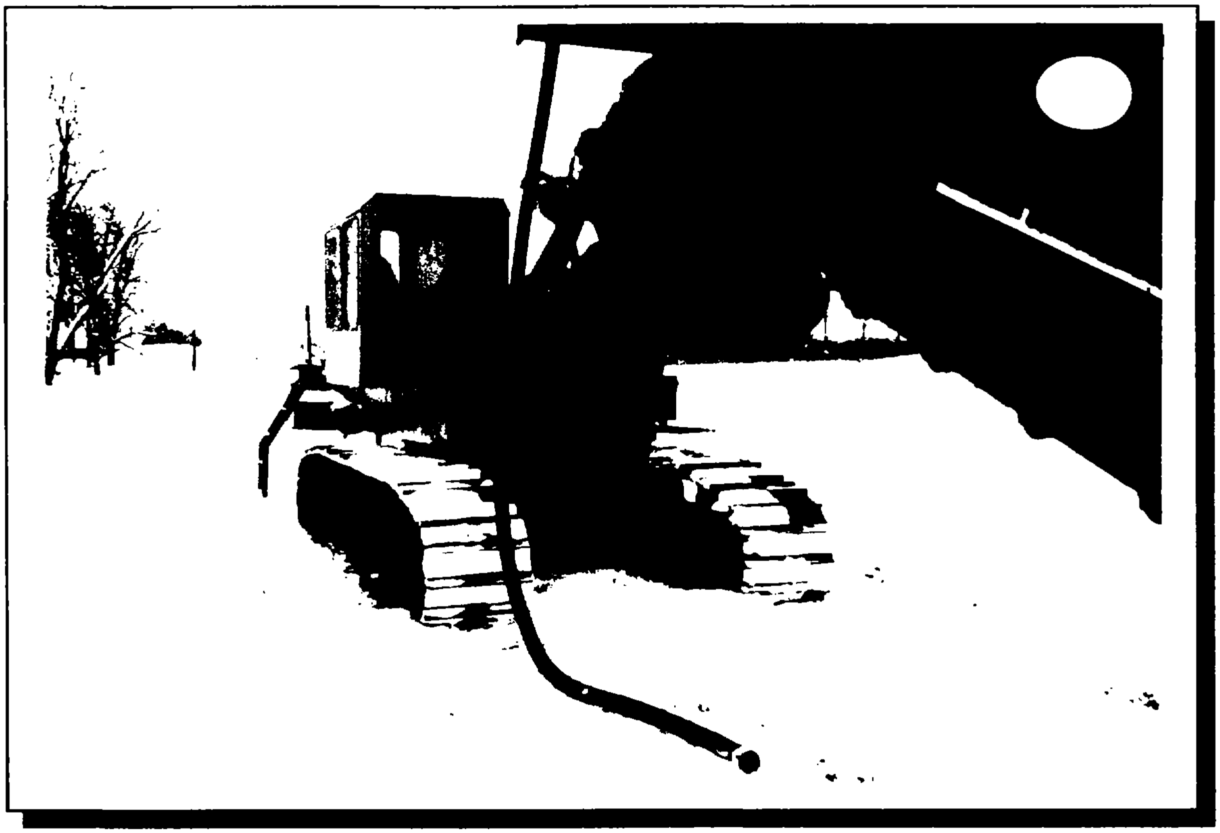
PHOTOGRAPH 10

PHOTOGRAPH 11

PHOTOGRAPH 12

PHOTOGRAPH 13

PHOTOGRAPH 14

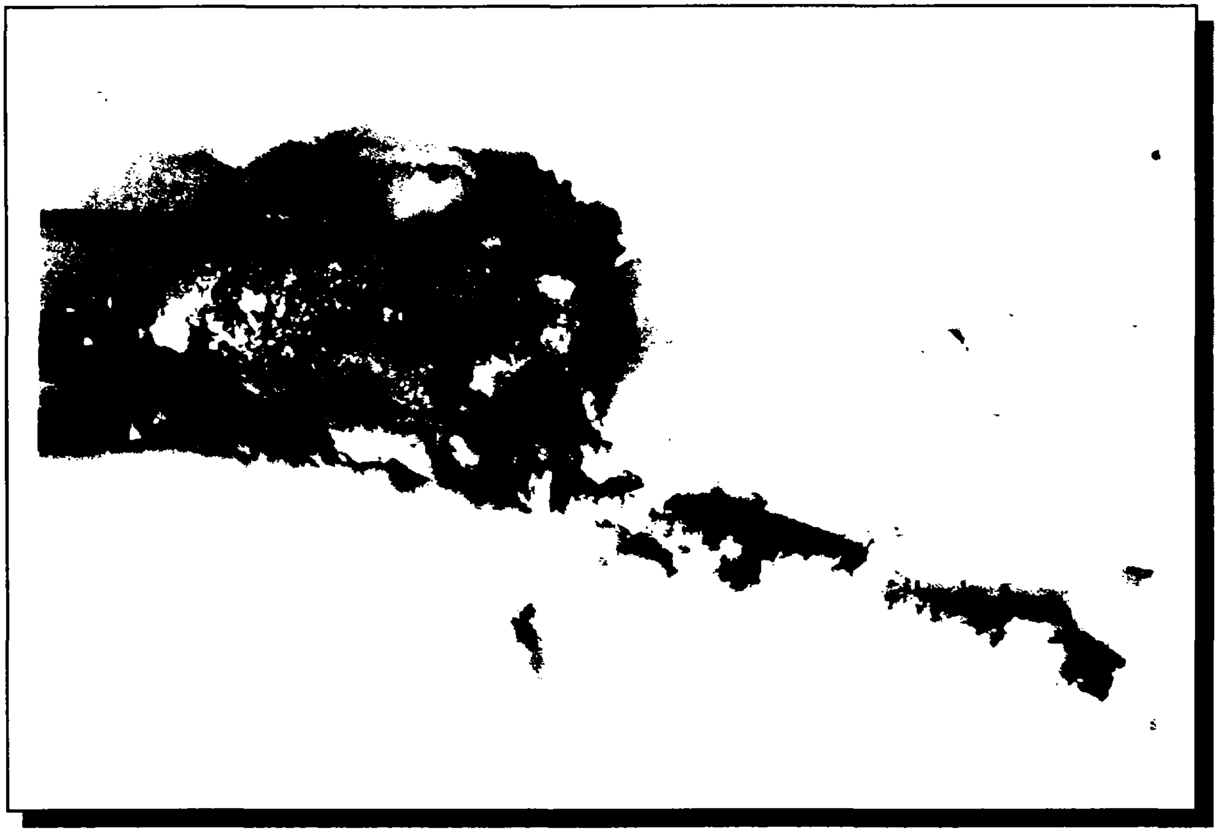


PHOTOGRAPH 15

PHOTOGRAPH 16

PHOTOGRAPH 17

PHOTOGRAPH 18



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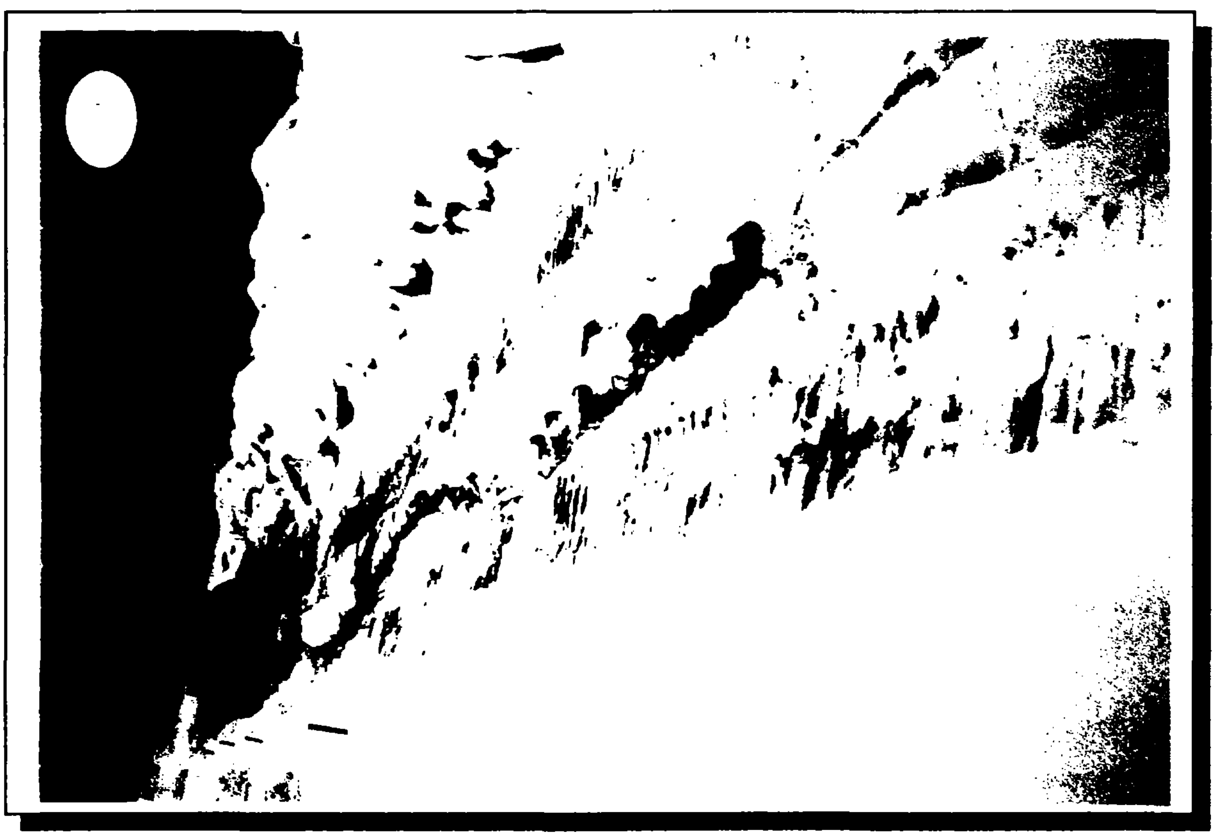
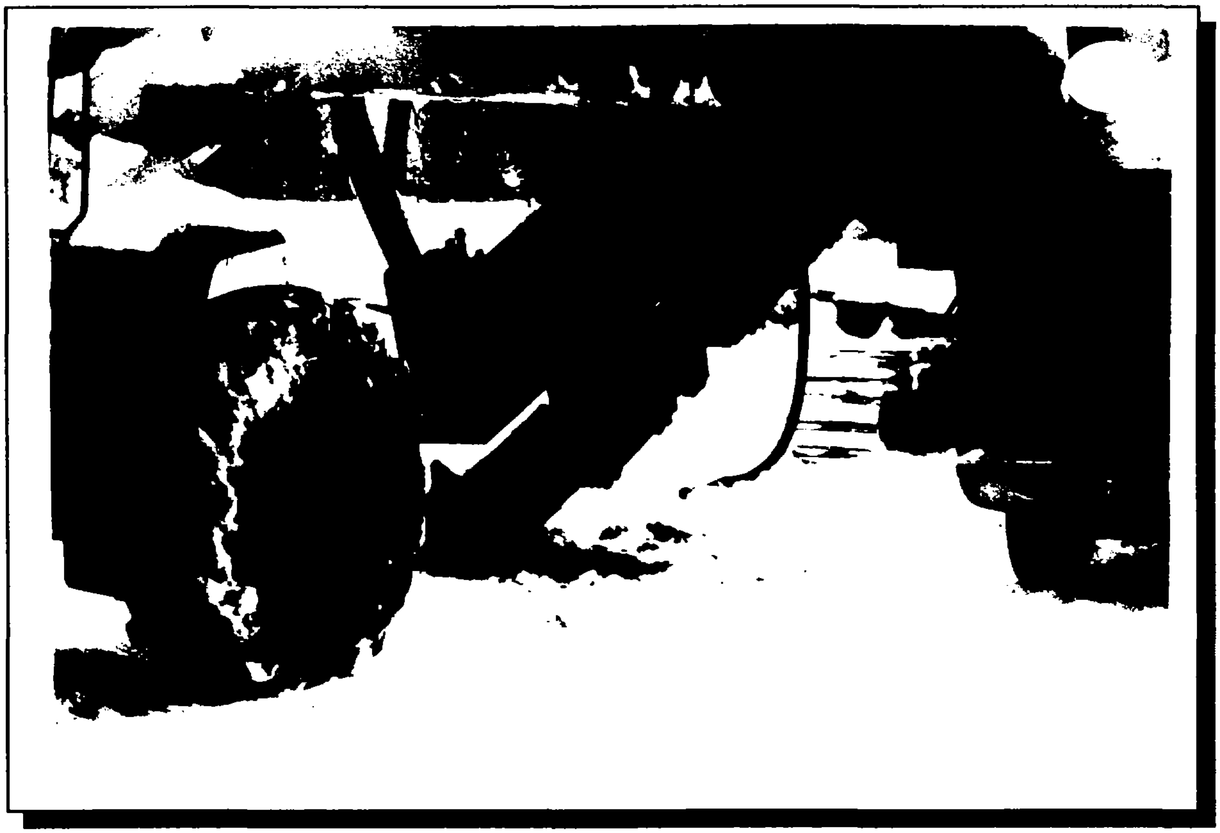


PHOTOGRAPH 20



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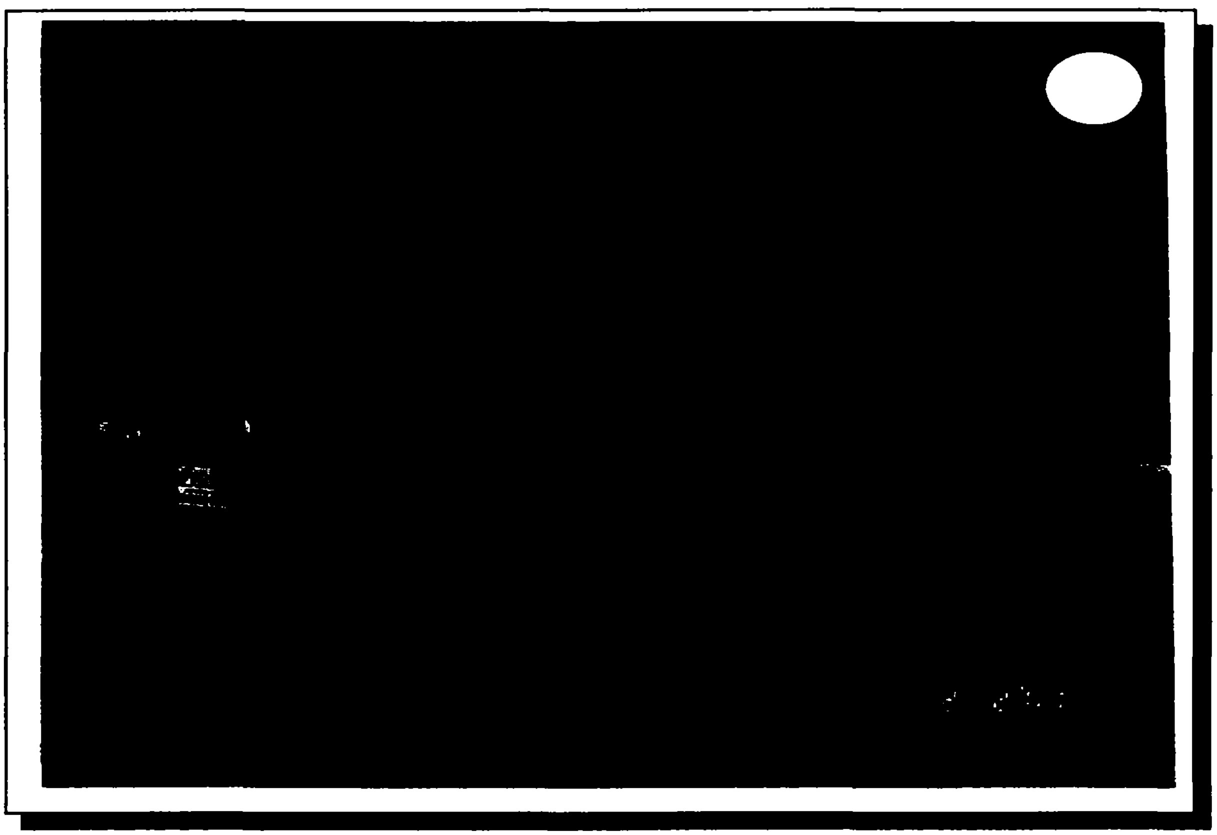
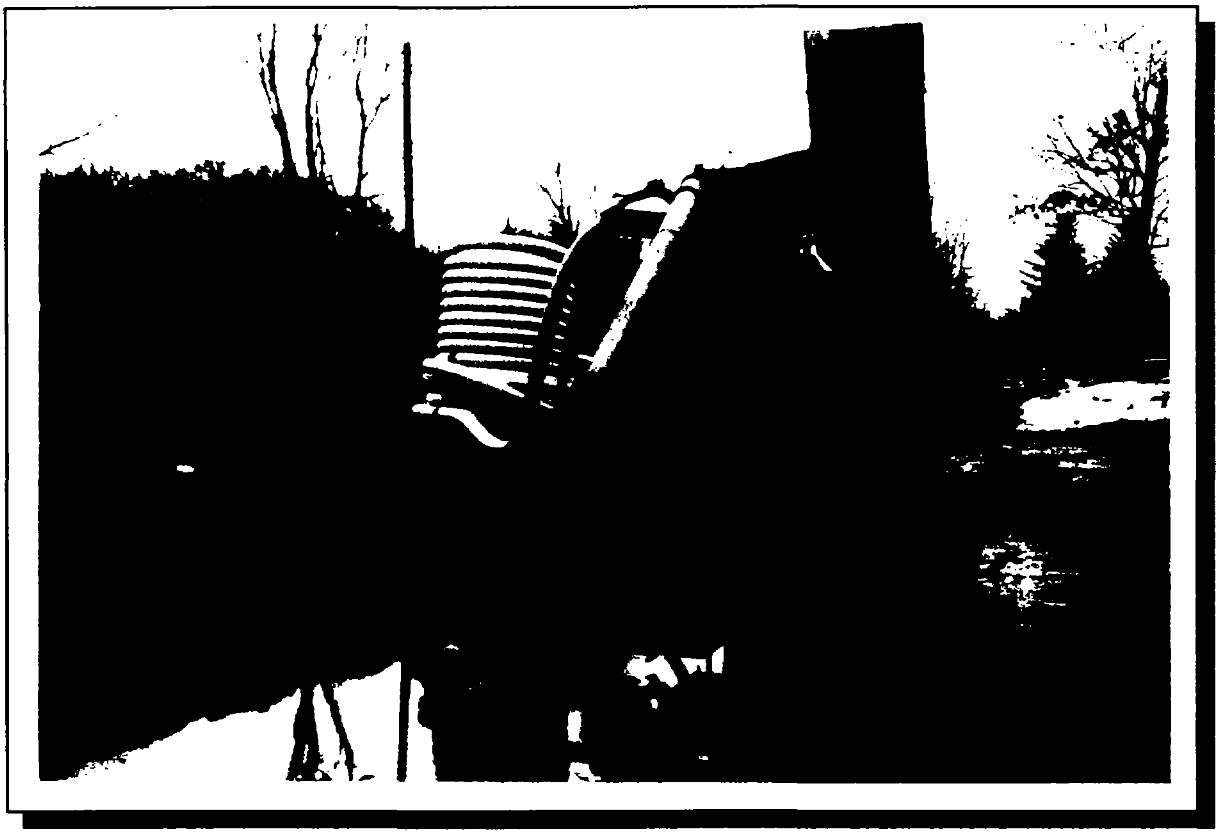


PHOTOGRAPH 22

PHOTOGRAPH 23

PHOTOGRAPH 24



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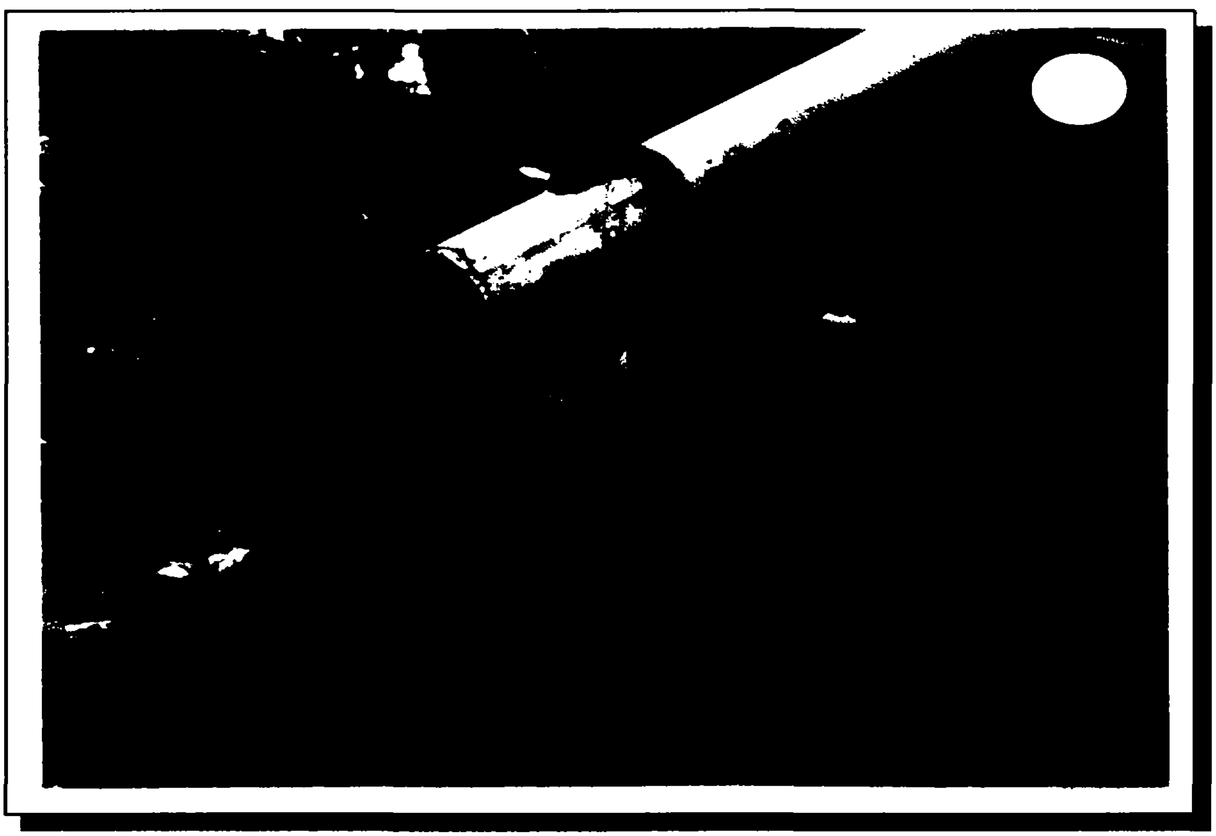
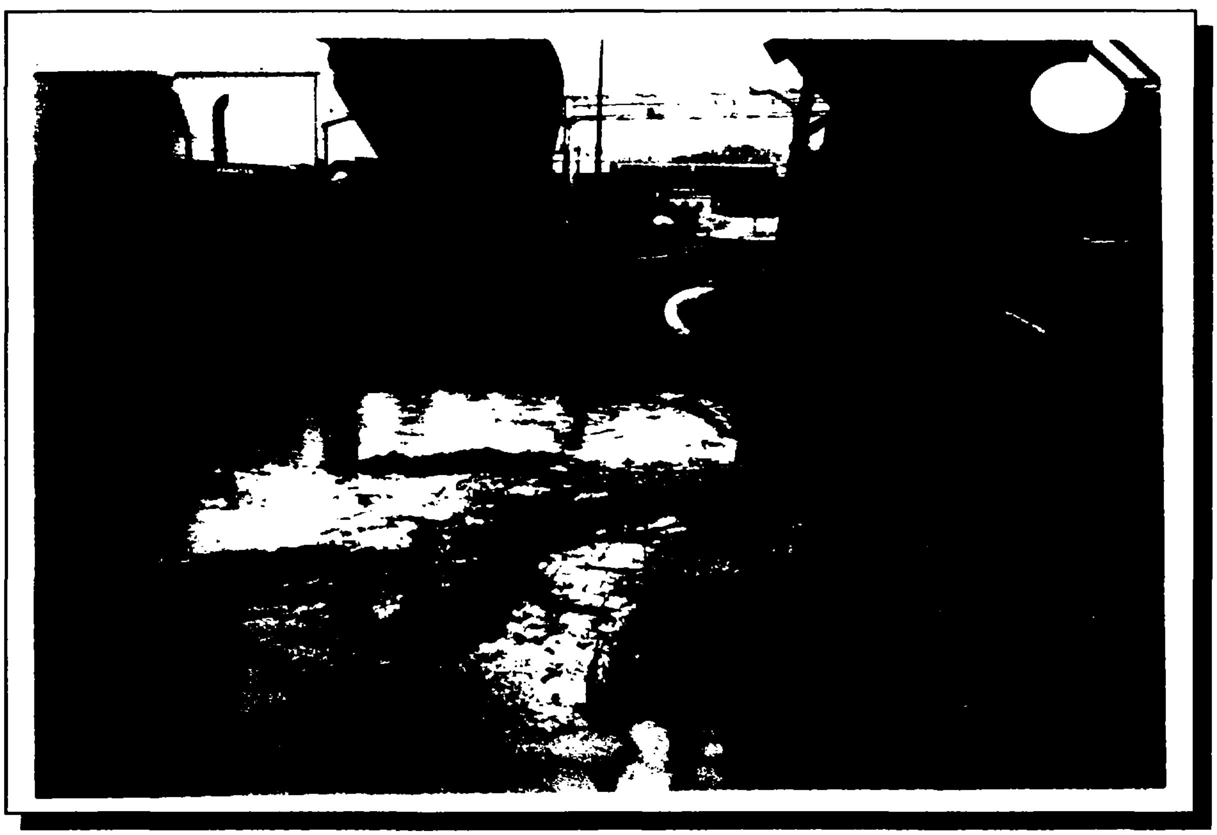


PHOTOGRAPH 26

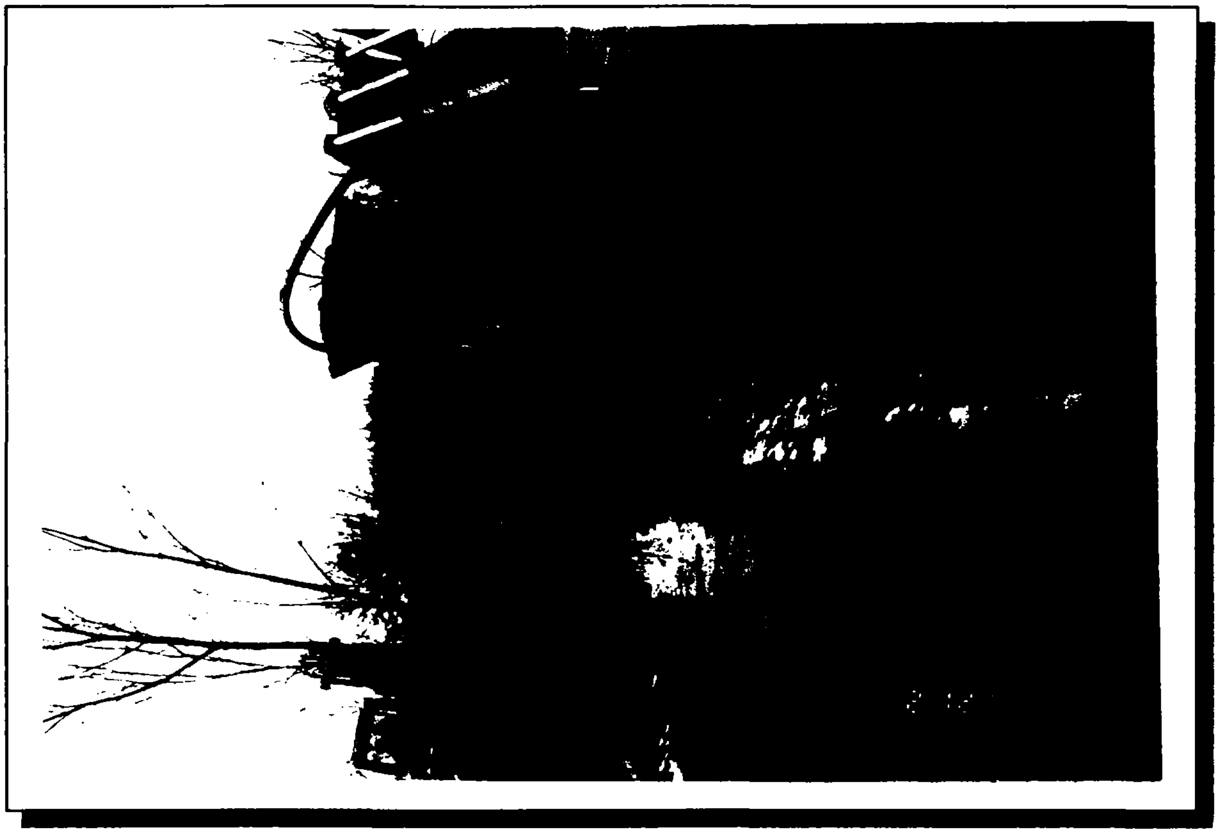
PHOTOGRAPH 27



PHOTOGRAPH 28

PHOTOGRAPH 29

PHOTOGRAPH 30



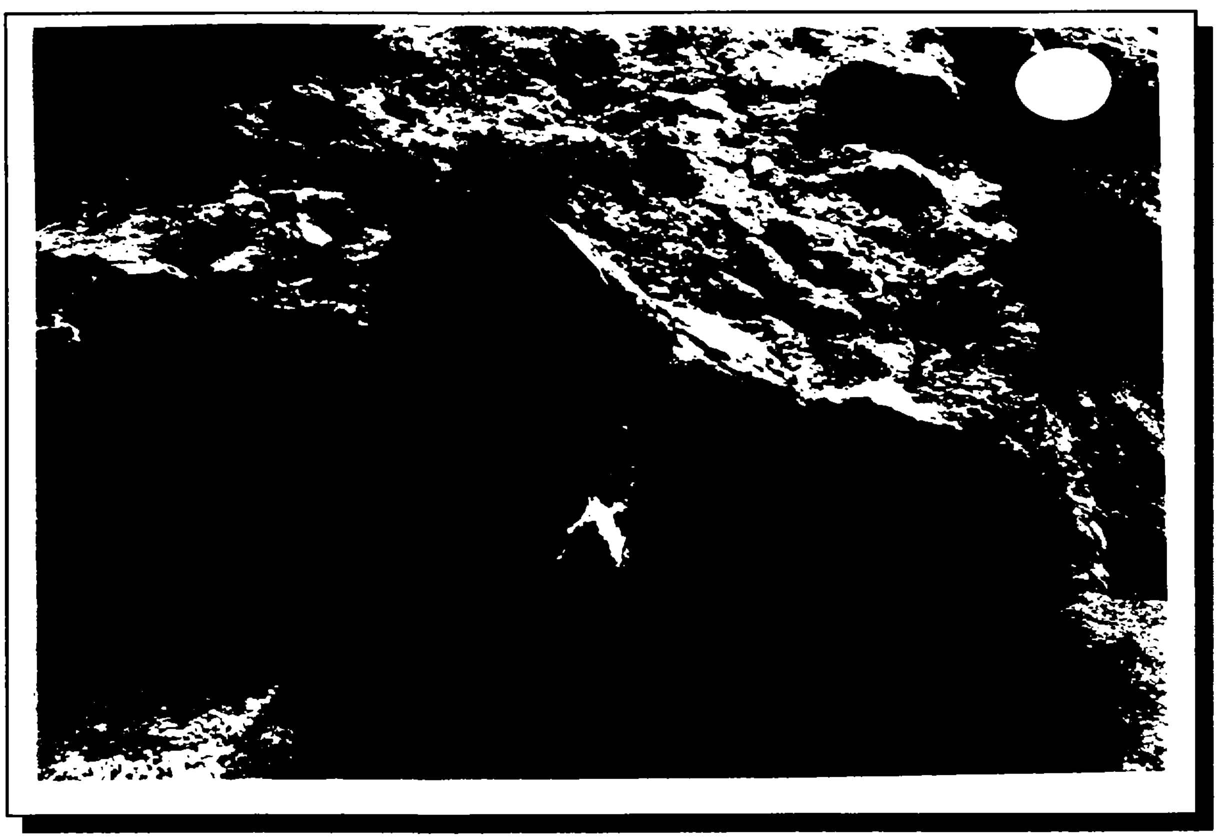
PHOTOGRAPH 31

PHOTOGRAPH 32

PHOTOGRAPH 33

PHOTOGRAPH 34

PHOTOGRAPH 35



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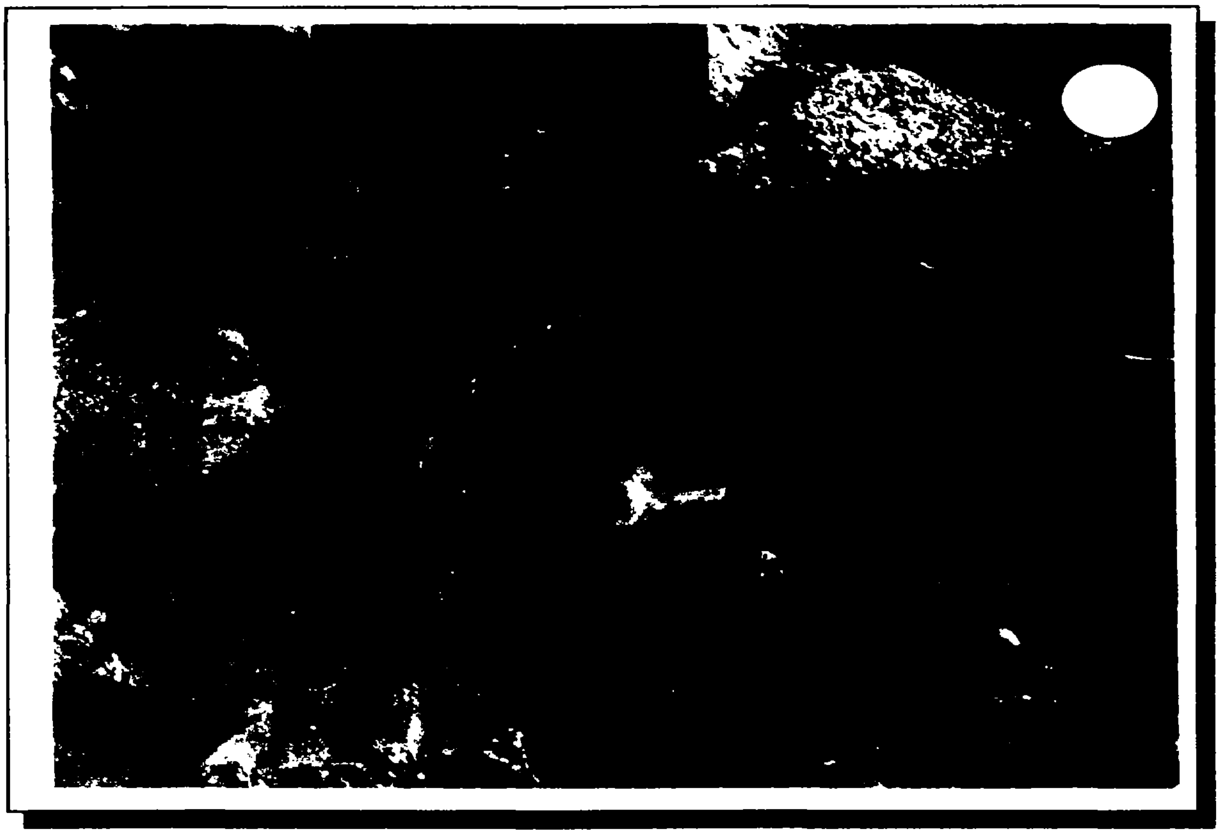
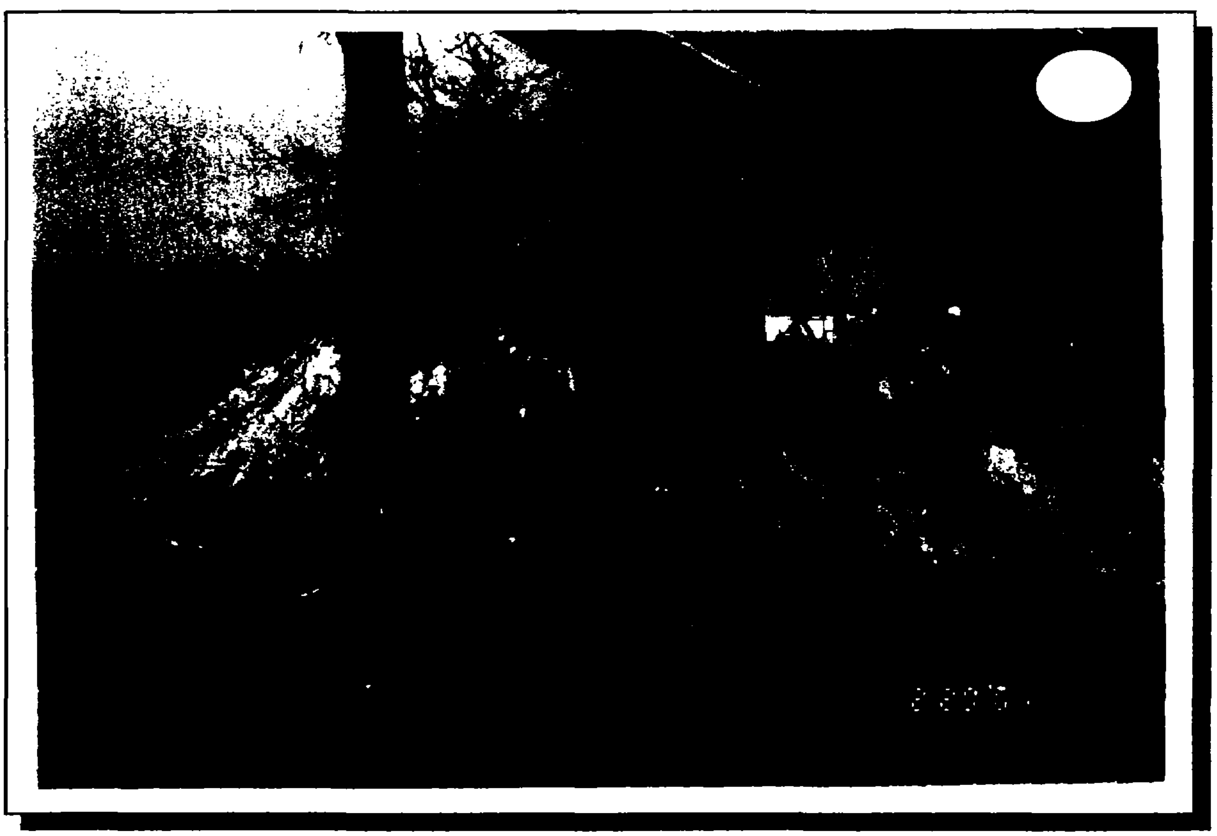


PHOTOGRAPH 37

PHOTOGRAPH 38

PHOTOGRAPH 39

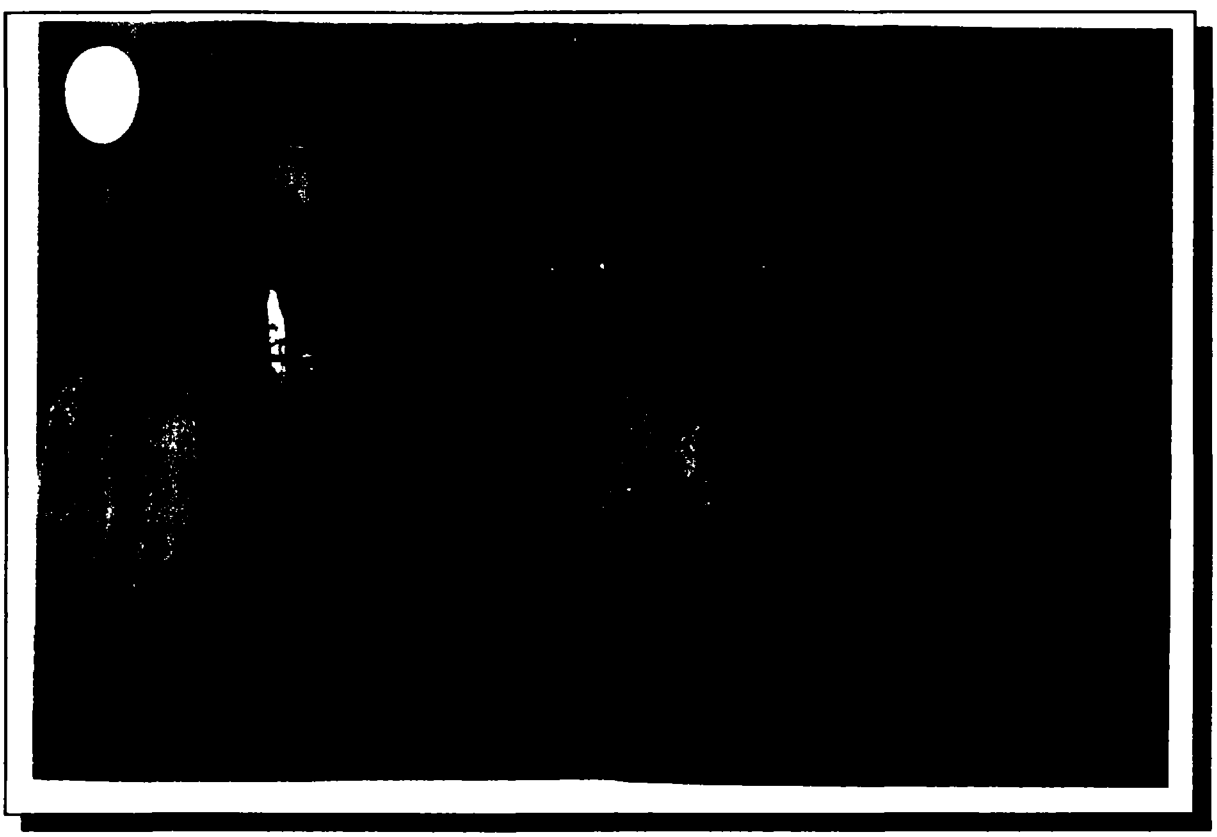


PHOTOGRAPH 40

PHOTOGRAPH 41

PHOTOGRAPH 42

PHOTOGRAPH 43

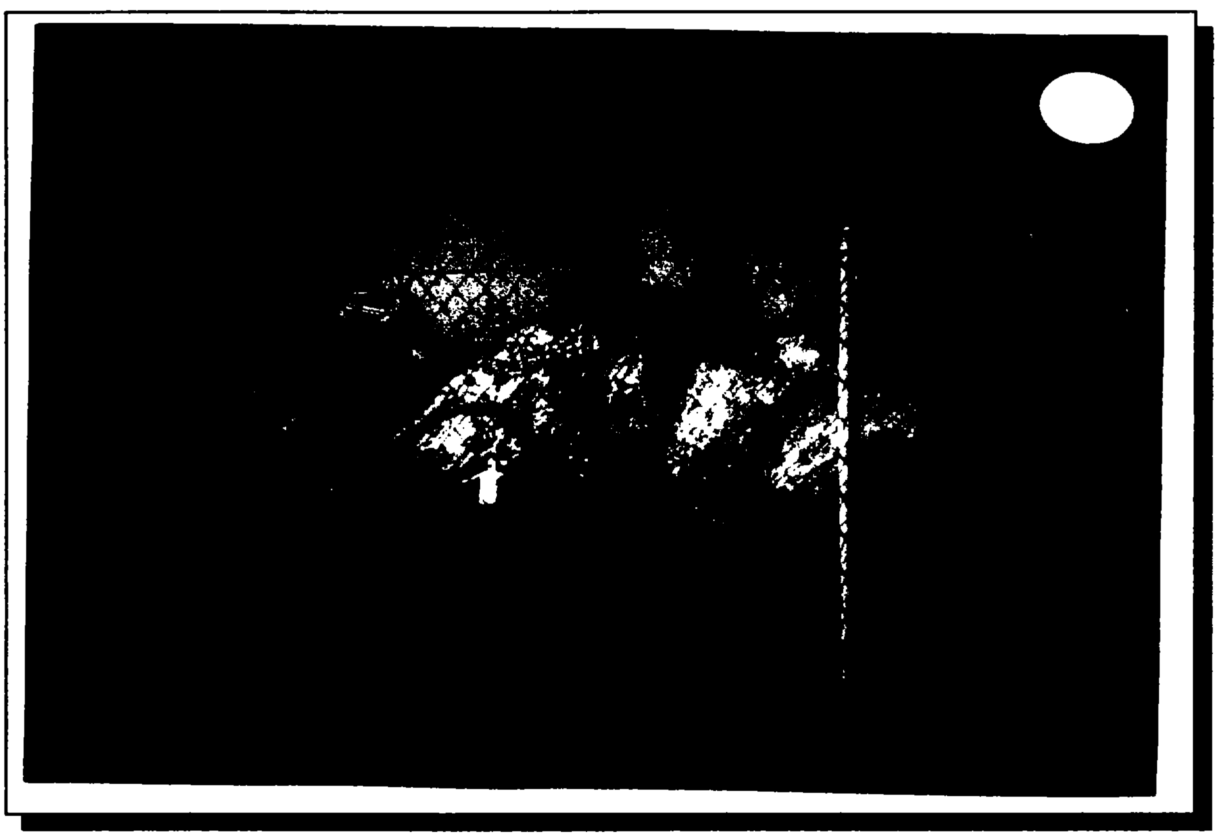


PHOTOGRAPH 44

PHOTOGRAPH 45

PHOTOGRAPH 46

PHOTOGRAPH 47



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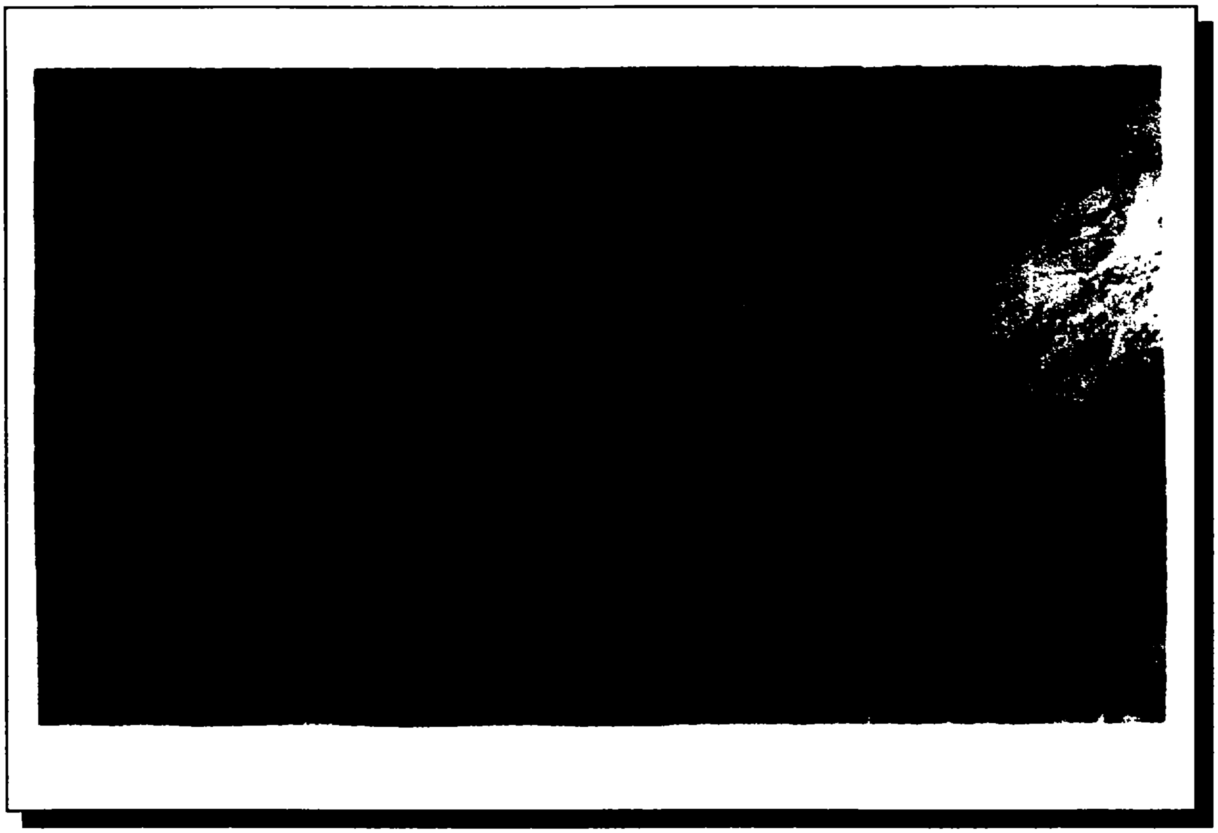

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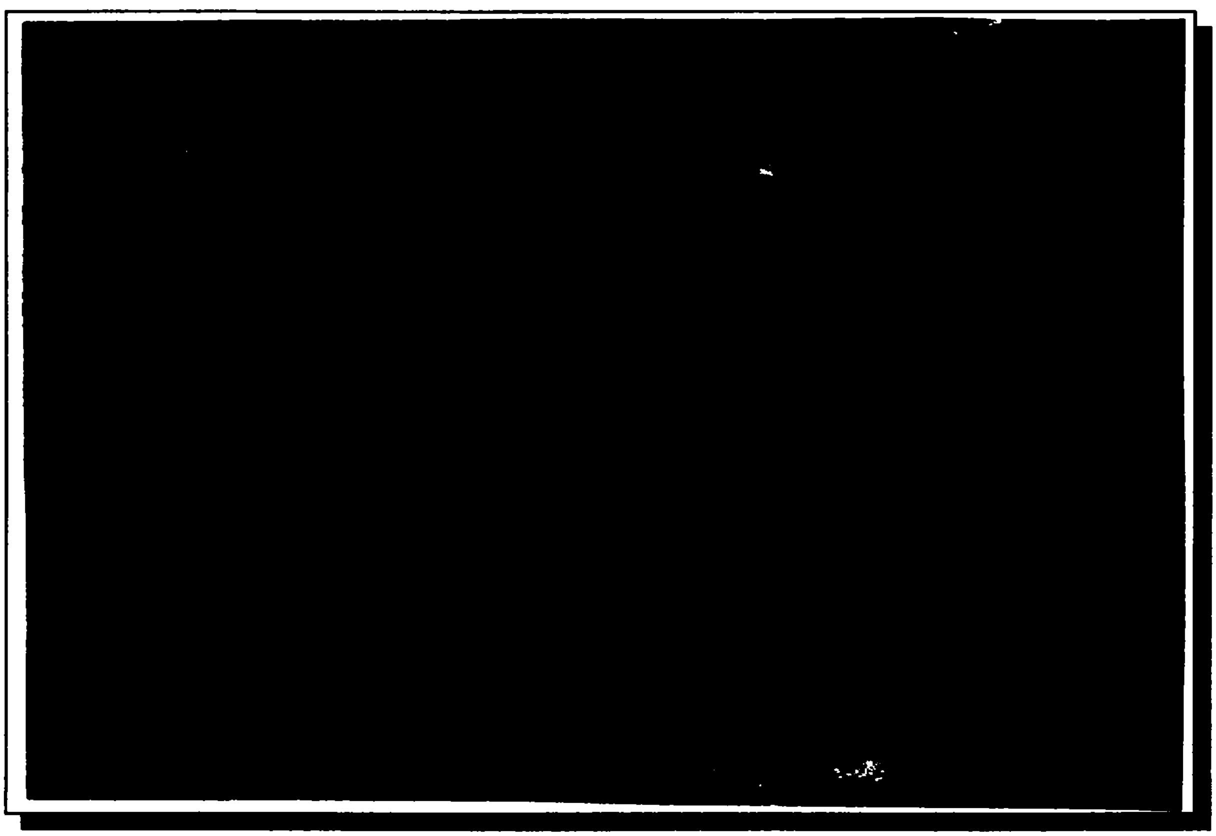

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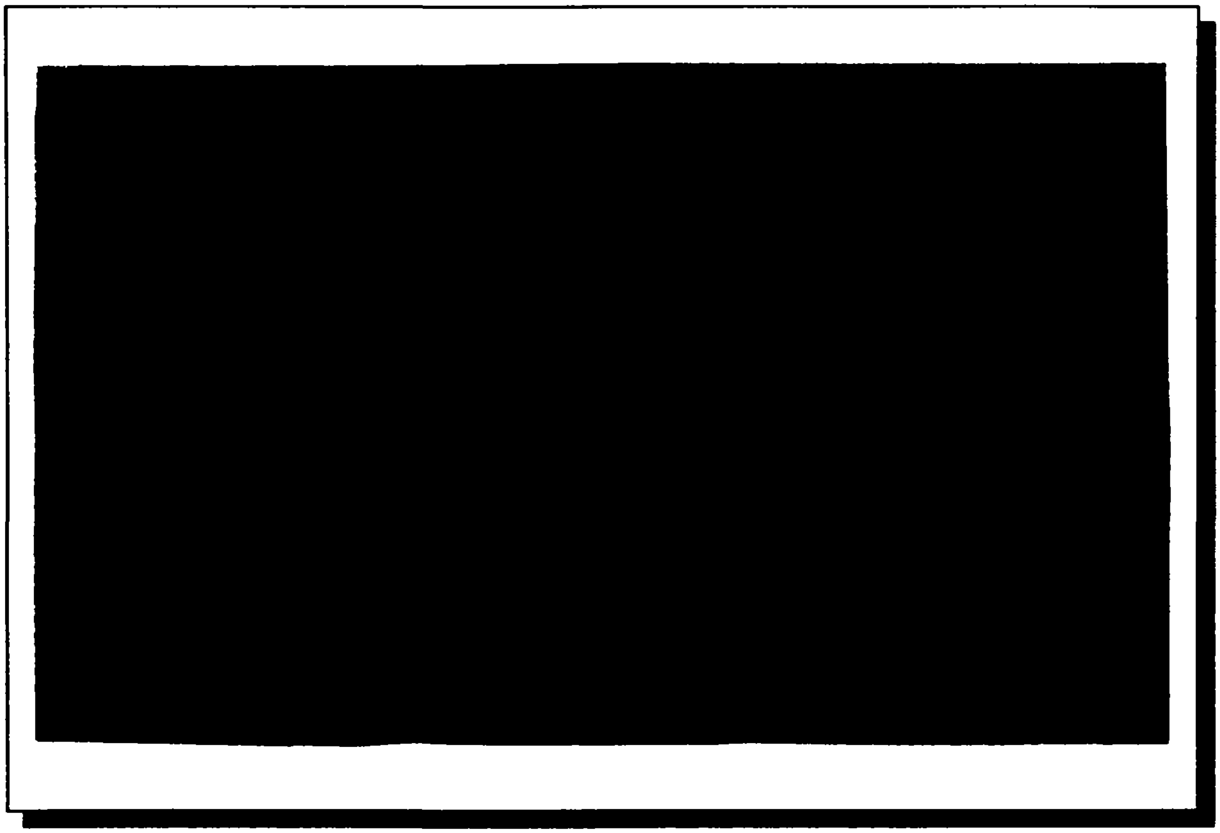

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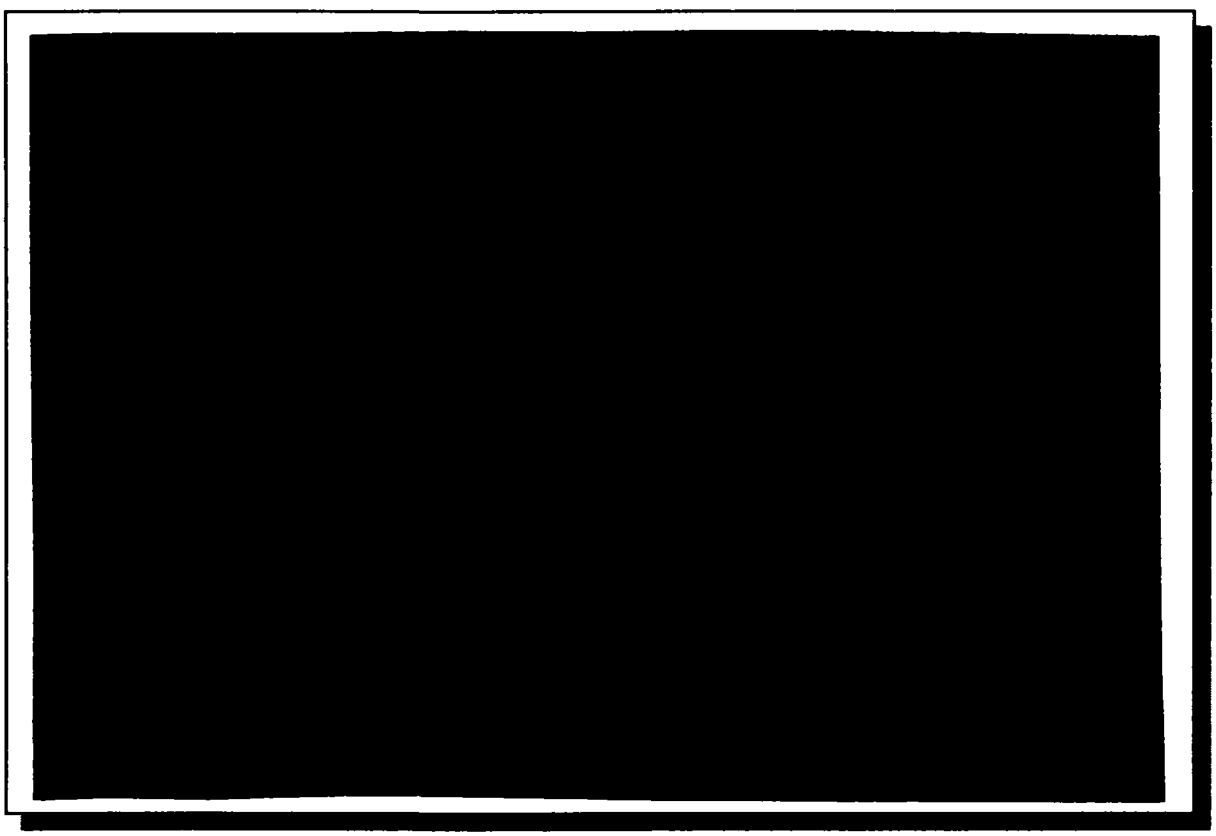

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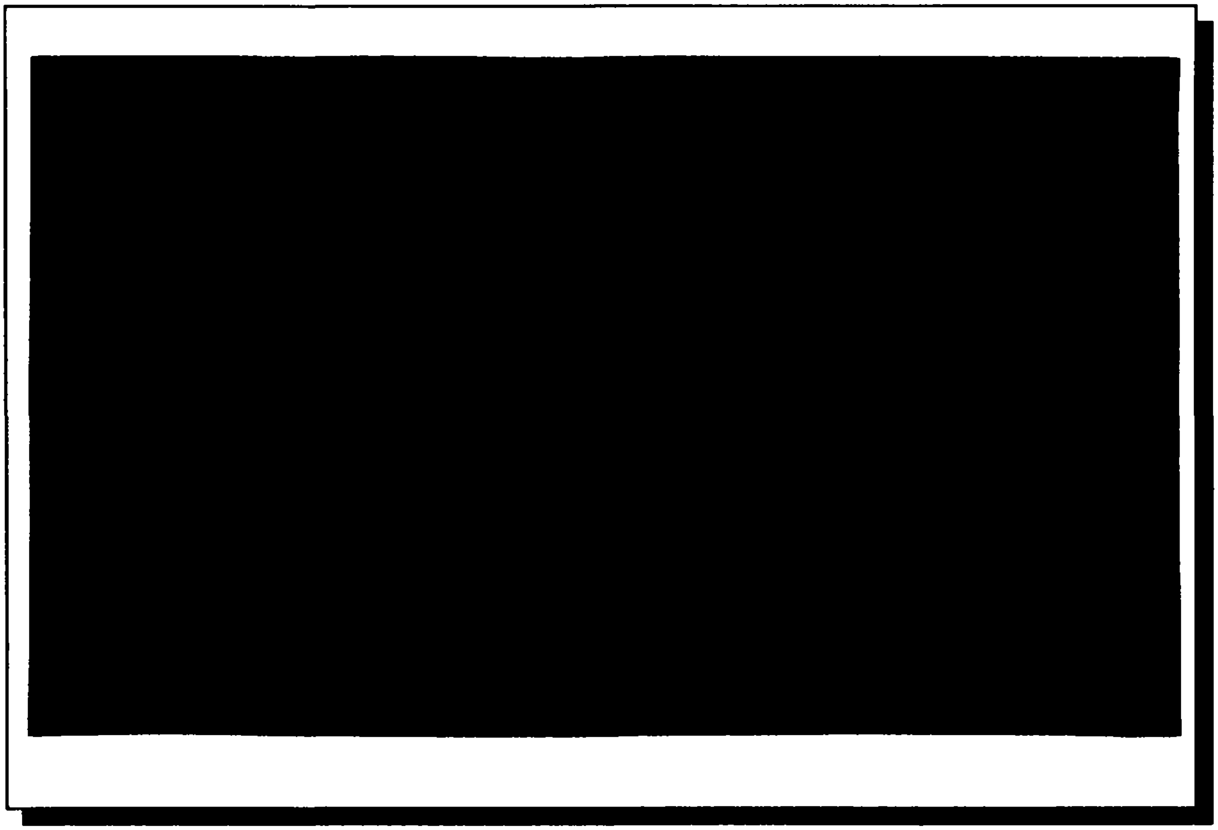
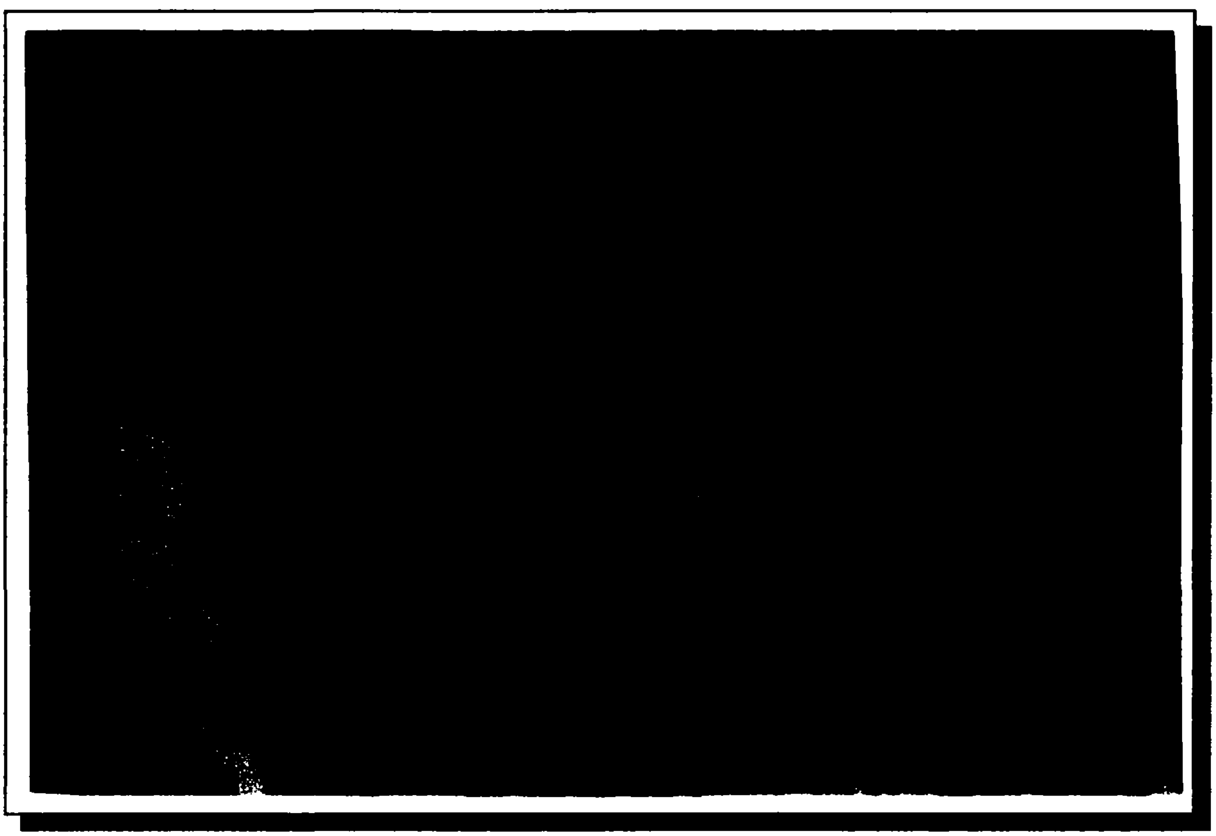
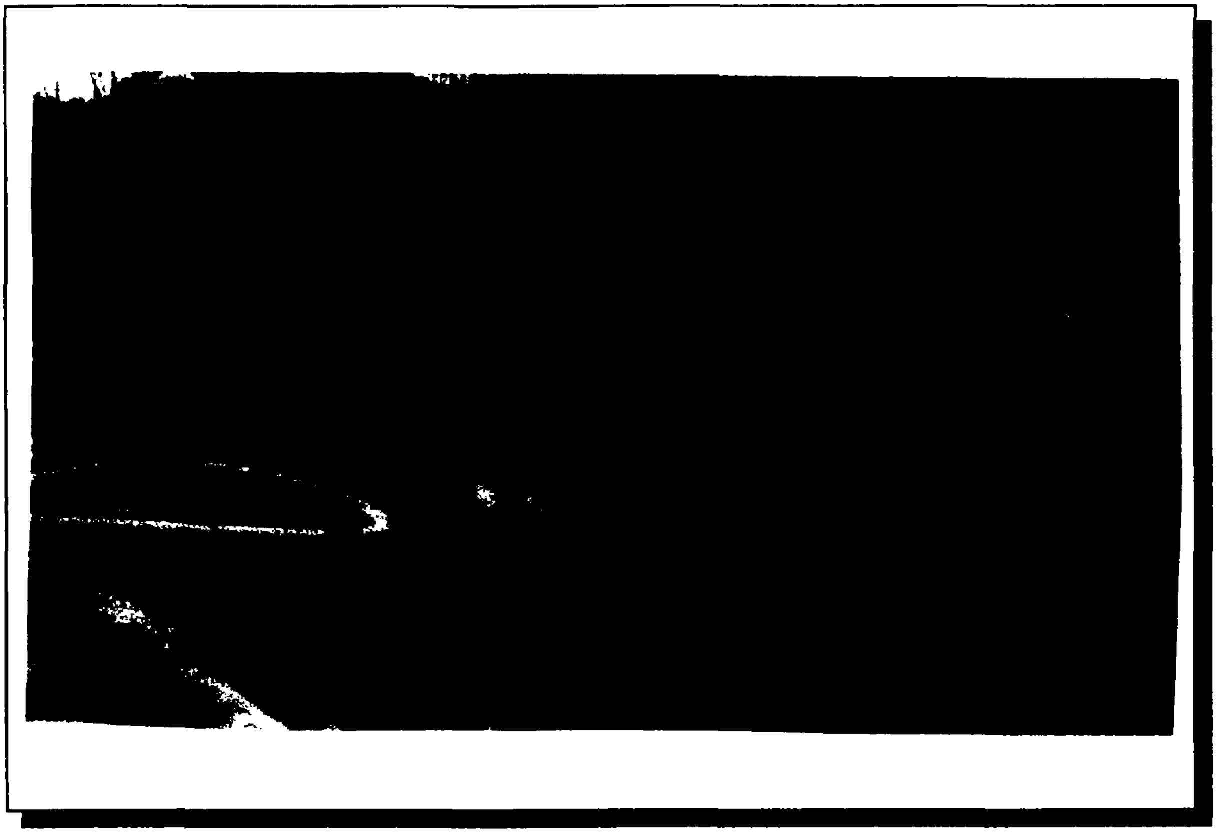


PHOTOGRAPH 53

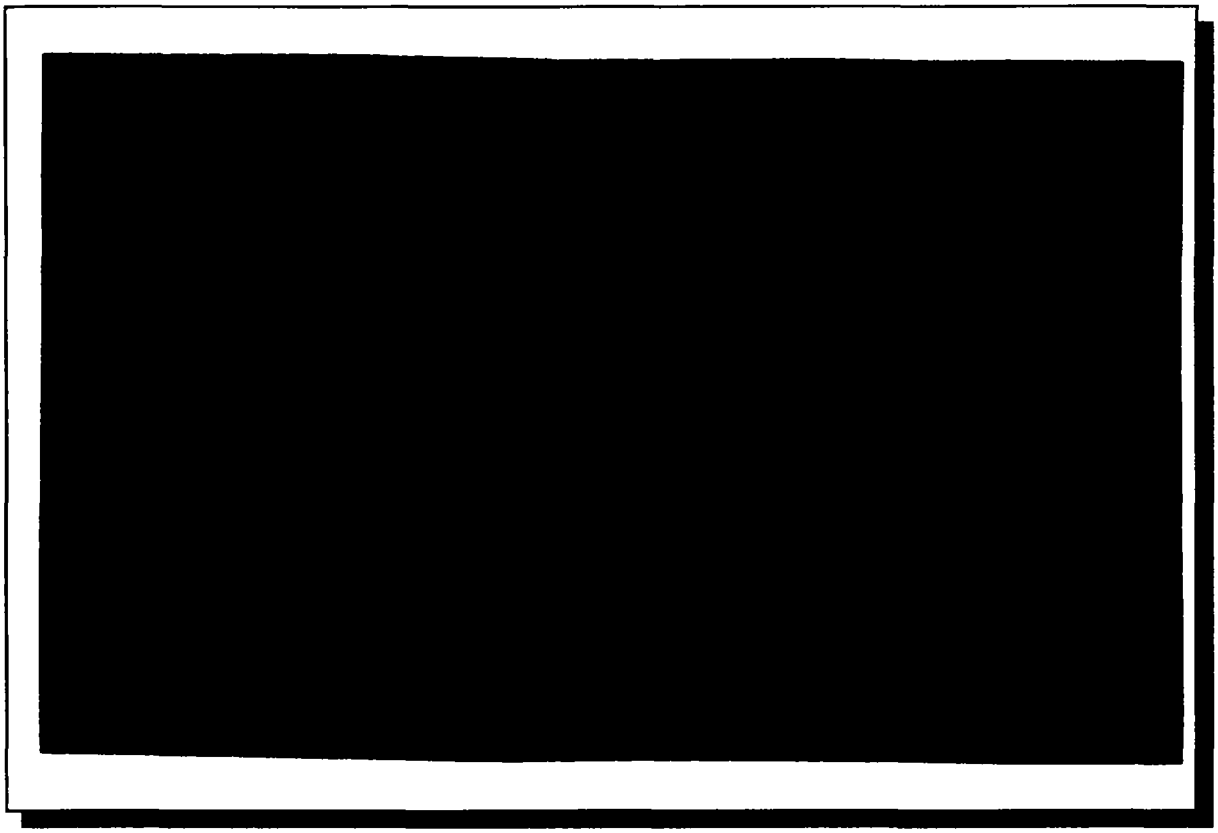


PHOTOGRAPH 54

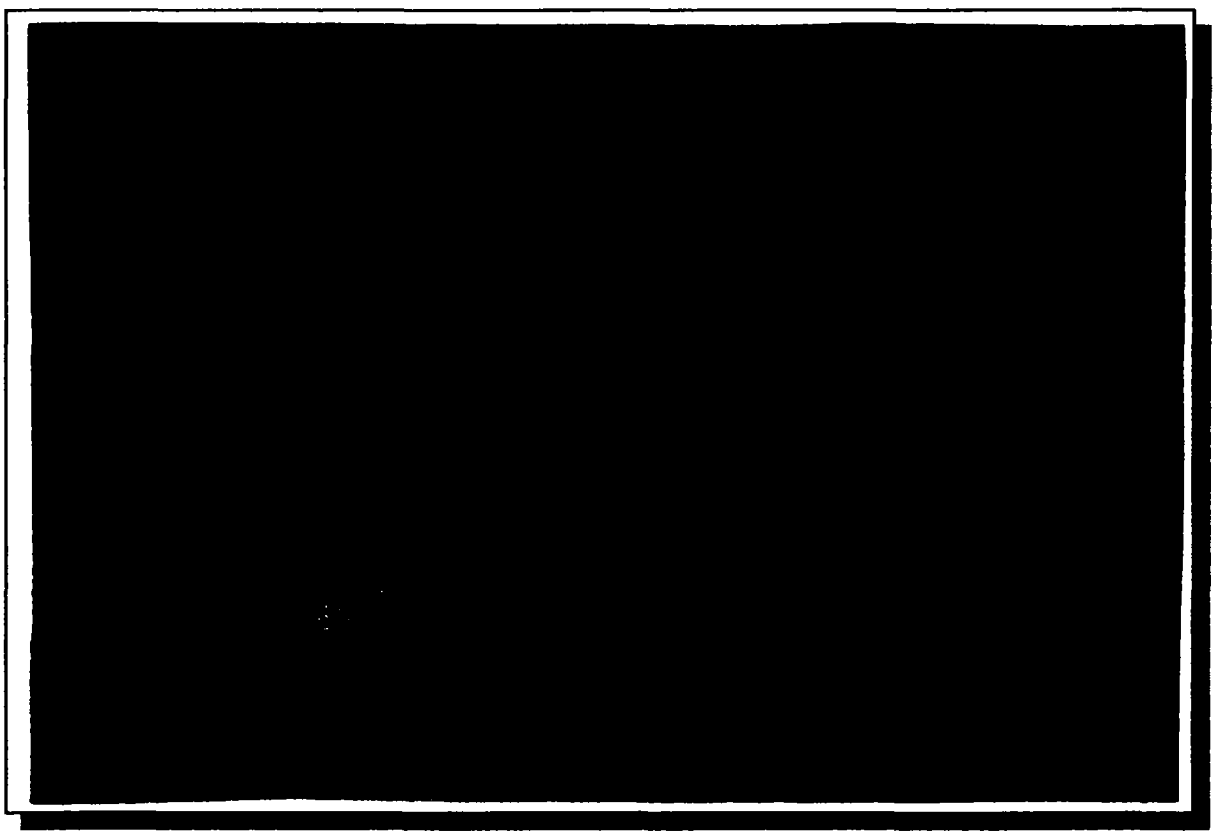


PHOTOGRAPH 55

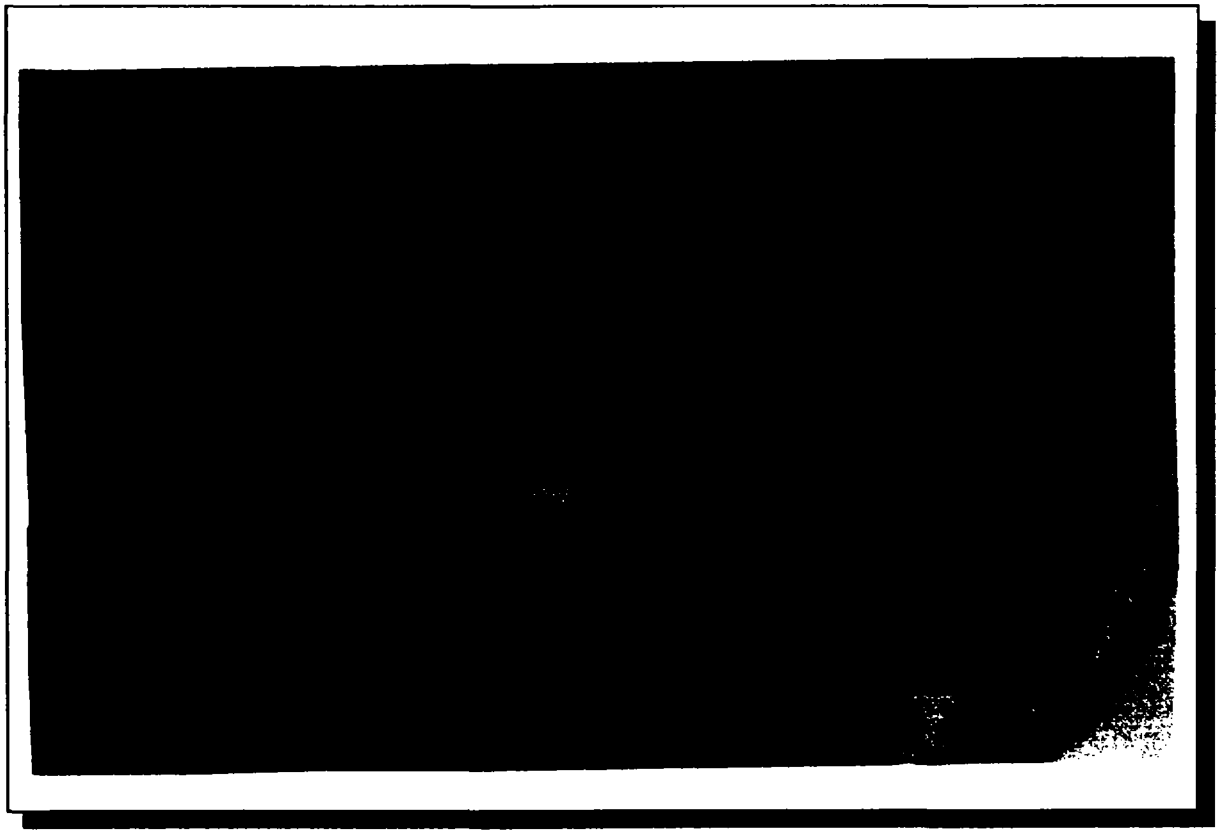
PHOTOGRAPH 56



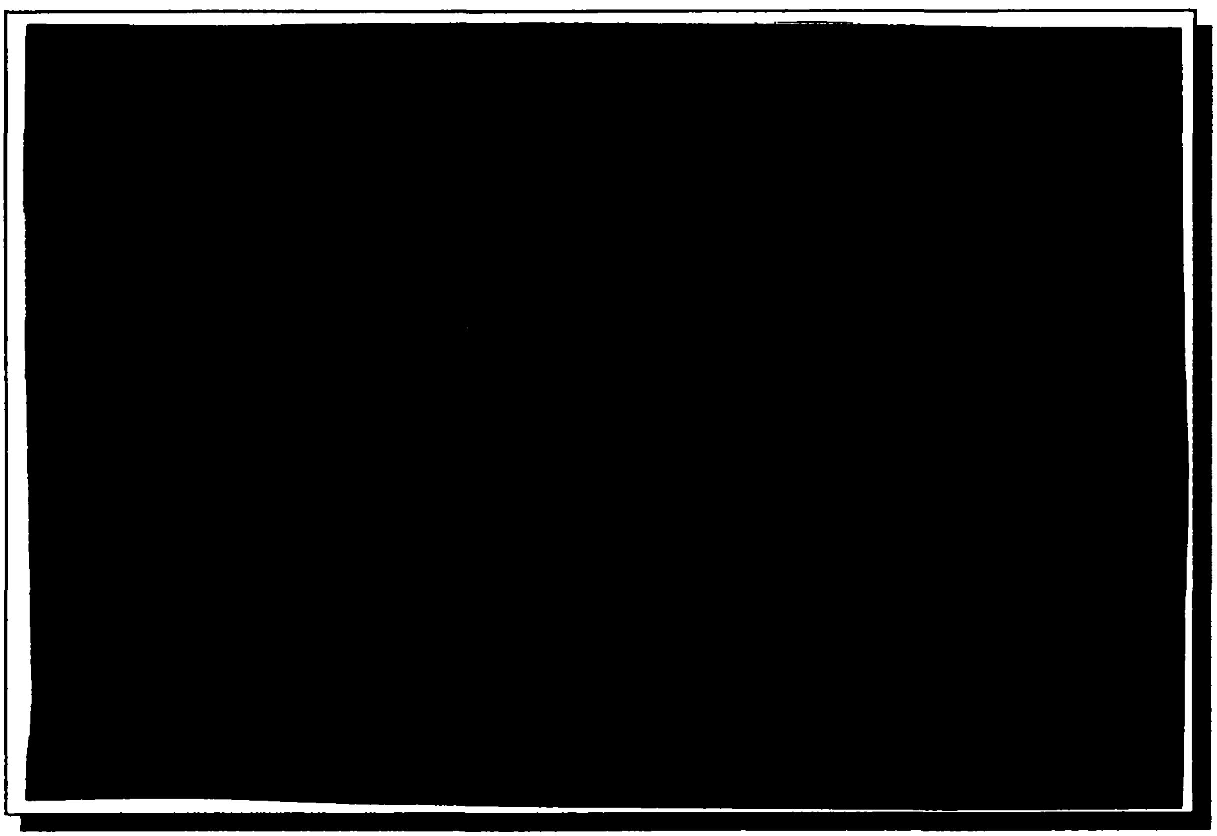
PHOTOGRAPH 57



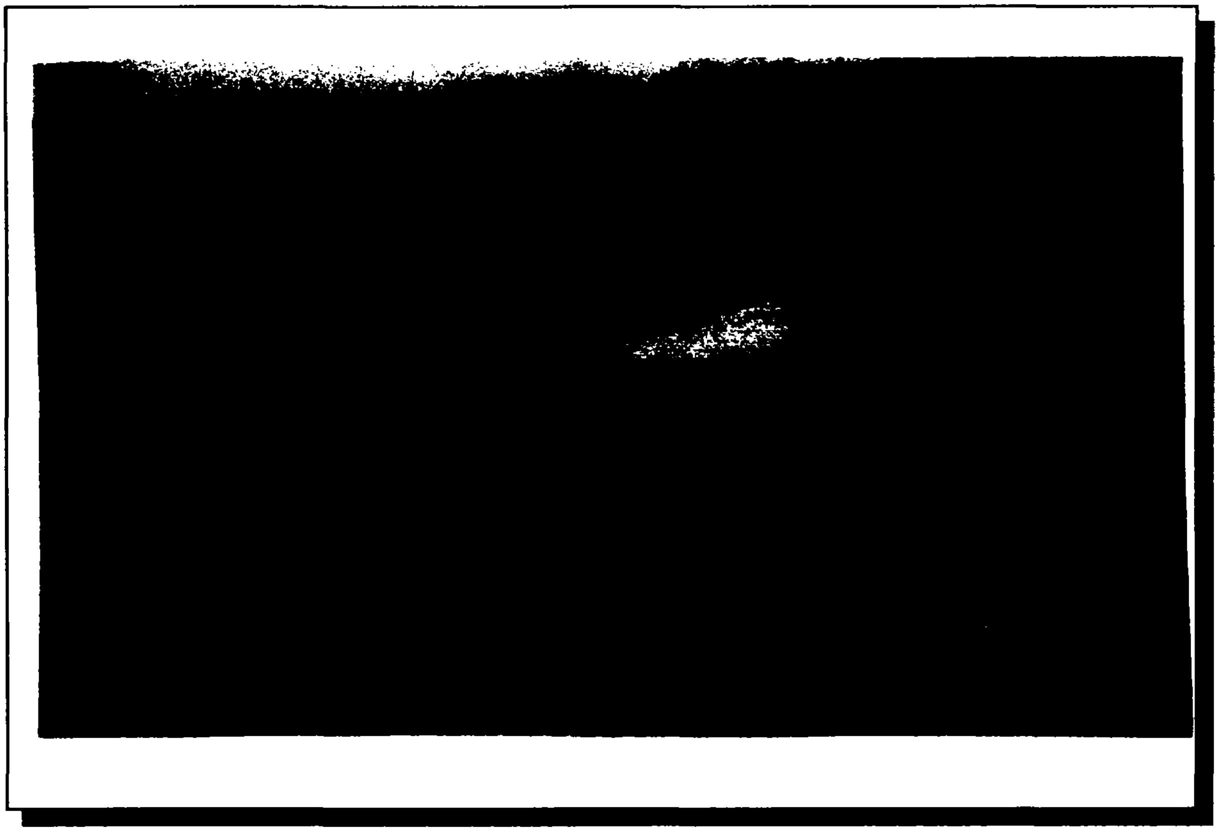
PHOTOGRAPH 58



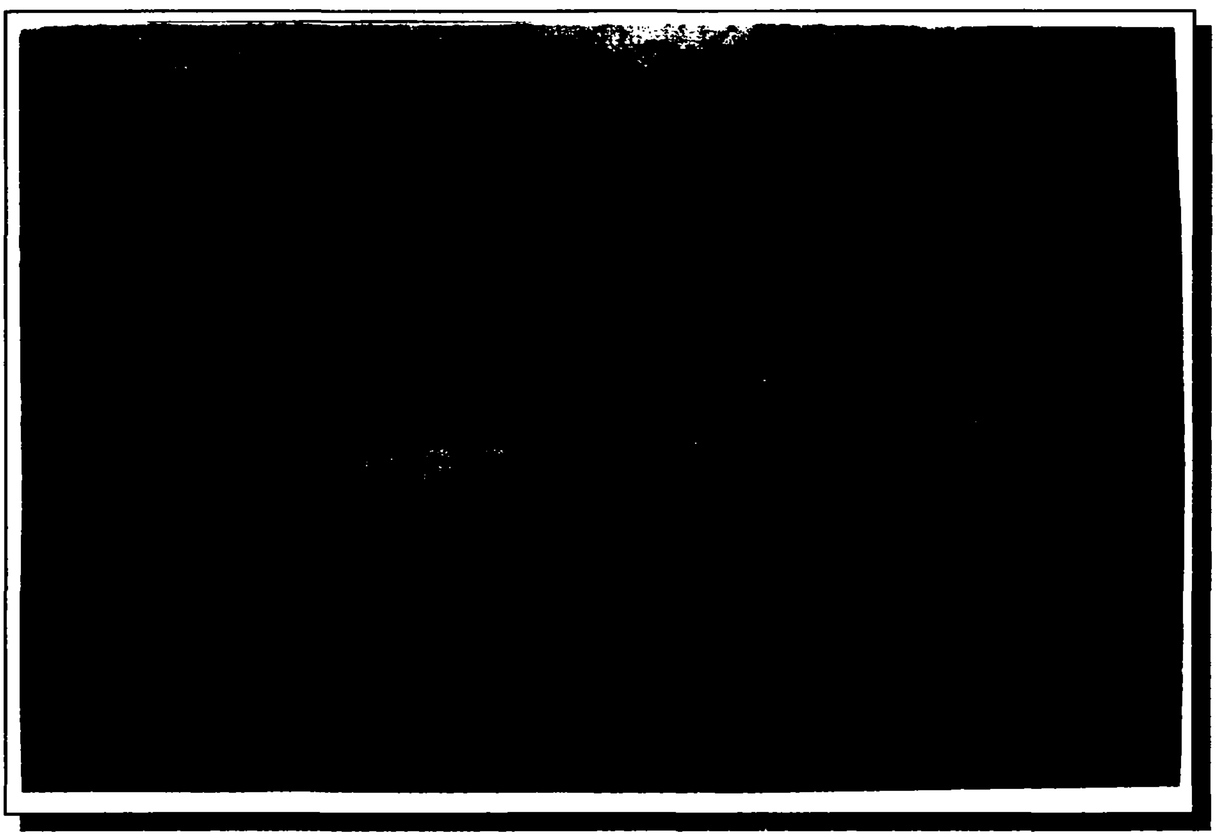
PHOTOGRAPH 59



PHOTOGRAPH 60



PHOTOGRAPH 61



PHOTOGRAPH 62

PHOTOGRAPH 63

APPENDIX F

Manufacturer's Product Specifications

- Groundwater Extraction Pumps
- Filter Pack Sand
- Groundwater Extraction Piping (HDPE)
- Geotextile
- Manholes and Covers
- Bentonite
- Well Screen
- Conveyance Piping and Fittings (HDPE)
- Miscellaneous Valves and Fittings (Stainless Steel)
- Flow Meters
- Galvanized Steel Pipe
- HDPE Fusion Machine
- Extrusion Welder
- Anti-Seep Bulkhead
- Backfill Sand
- Stone #53

MANUFACTURER'S PRODUCT SPECIFICATIONS

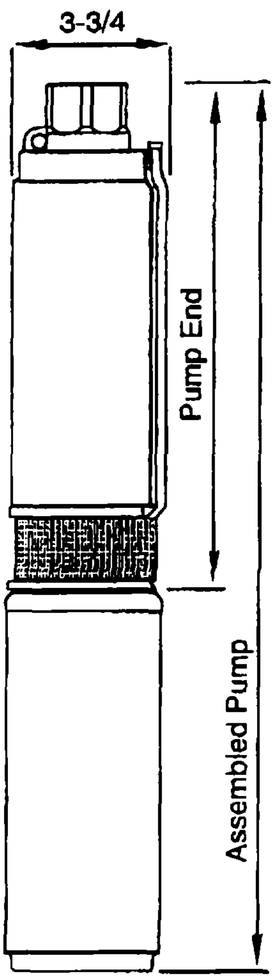
Groundwater Extraction Pumps

BERKELEY

ATTN: CHR...
630-836-8951

4" submersible pumps – 5 and 7 gpm TrimLine

OUTLINE DIMENSIONS

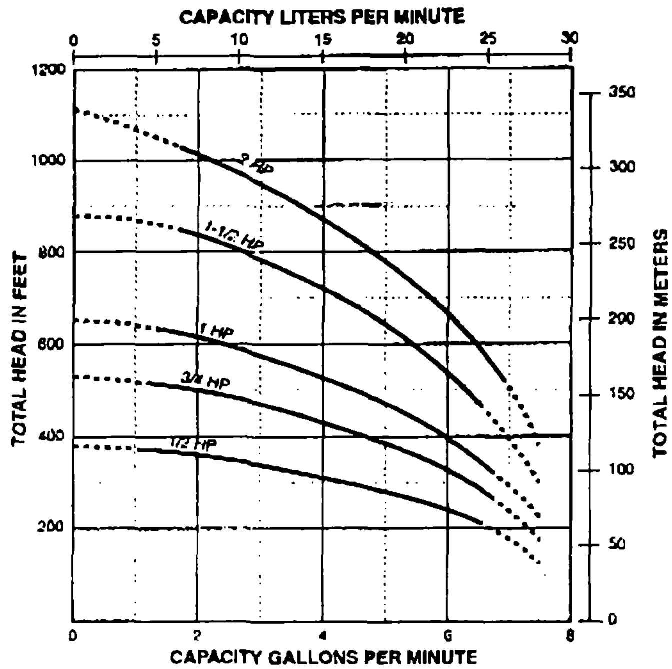


Discharge	
5 GPM	1-1/4" NPT
7 GPM	1-1/4" NPT

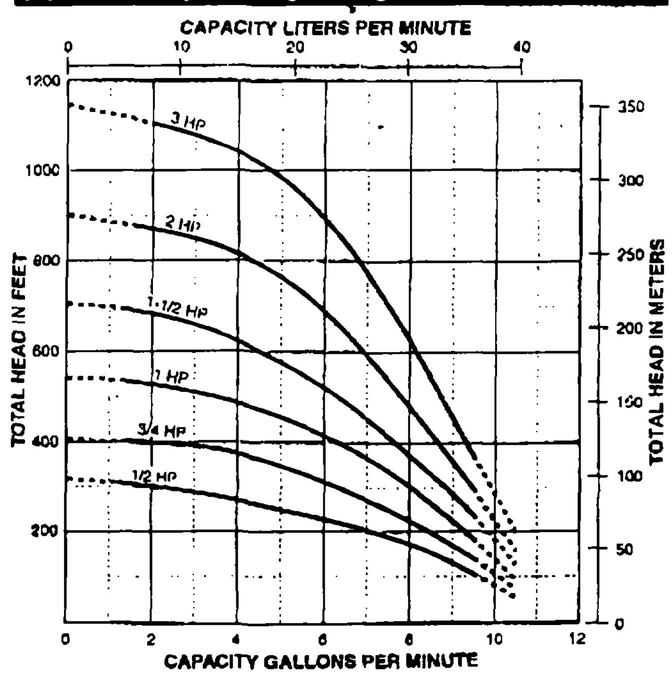
For dimensions, refer to Ordering Information table.

Dimensions (in inches) are for estimating purposes only.

PUMP PERFORMANCE - 5 GPM



PUMP PERFORMANCE - 7 GPM

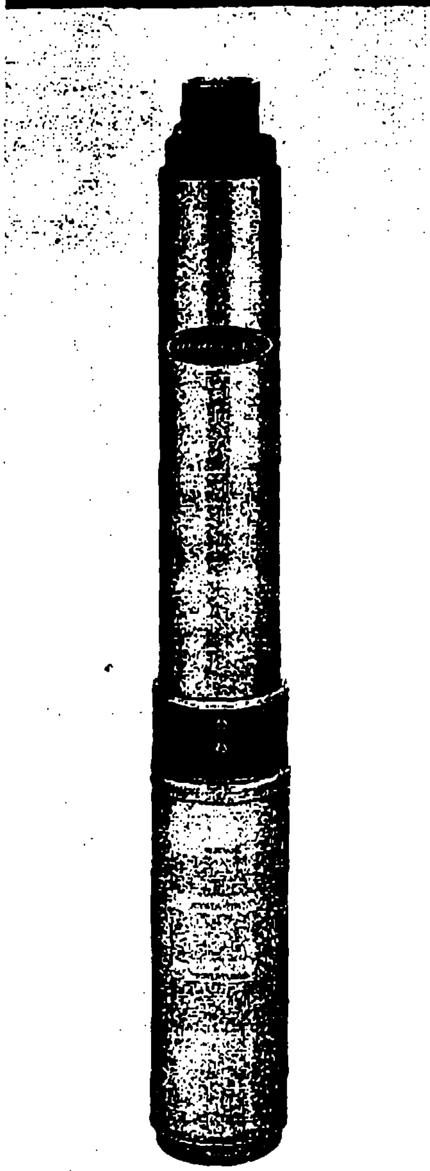


Tested and rated in accordance with Water Systems Council standards.

NOTE: Pumps installed with a Pro-Source™ tank require a 100 PSI relief valve. Pumps installed with a conventional tank require a 75 PSI relief valve. Relief valve must be capable of relieving entire flow of pump at relief pressure.

BERKELEY

4" submersible pumps – 5 and 7 gpm TrimLine



Precision-engineered, high-quality, rugged MGS Stainless Steel Series Pumps deliver efficient, dependable performance even in rough, aggressive water.

The TrimLine™ 5 and 7 GPM Series Pumps are 3-3/4" maximum O.D. Heads to 1,150 feet and capacities to 10.5 GPM. Built to deliver long-term, trouble-free service. Floating impeller design resists sand and reduces sand locking. These pumps feature the patented SignaSeal™ staging system.

APPLICATIONS

- **Water systems...** for residential, industrial, commercial, multiple housing and farm use.

SPECIFICATIONS

Shell – Stainless steel
Discharge – Stainless steel
Discharge Bearing – Nylatron®
Intermediate Bearing – (On larger units) polycarbonate, nitrile rubber and stainless steel
Impellers – Acetal
Diffusers – Polycarbonate
Suction Caps – Polycarbonate with stainless steel insert
Thrust Pads – Proprietary spec.
Shaft and Coupling – Stainless steel
Intake – Stainless steel
Intake Screen – Stainless steel
Cable Guard – Stainless steel
Agency Listings – NFS, CSA and UL
Check Valve – Acetal

This product is Listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL).

MGS STAINLESS STEEL

FEATURES

Patented Staging System – Our proven SignaSeal™ staging system incorporates a harder-than-sand ceramic wear surface that when incorporated with our floating impeller design, greatly reduces problems with abrasives, sand lock-up and running dry.

Discharge – Corrosion-resistant 300 grade stainless steel for durability in aggressive water. Large octagon wrench area for ease of installation.

Discharge Bearing – Exclusive self-lubricating Nylatron® bearing resists wear from sand.

Intake – Corrosion-resistant 300 grade stainless steel for durability in aggressive water.

Shaft – Positive drive from 7/16" hexagonal heavy-duty 300 grade stainless steel.

Coupling – Stainless steel press fit to pump shaft. Couples to all standard NEMA motors.

Shell – Highest grade, heavy-walled corrosion-resistant stainless steel. *Threaded for easy servicing.*

Hardware – All screws, washers and nuts are corrosion-resistant 300 grade stainless steel.

Check Valve – Durable internal Flomatic® spring-loaded check valve.

Cable Guard – Corrosion-resistant stainless steel guard protects motor leads. Tapered ends prevent pump from catching on well.

Intake Screen – Corrosion-proof polypropylene.

Franklin Electric Motor – 2 and 3 wire NEMA standard super stainless series water filled motors.

In order to provide the best products possible, specifications are subject to change.

BERKELEY

4" submersible pumps – 5 and 7 gpm TrimLine

ORDERING INFORMATION

GPM	Motor Type	HP	Stgs.	PH	Volt	Assembled Pump Weight Catalog Number	Assembled Pump Weight Length Inches*	Assembled Pump Weight Weight Pounds*	Pump End Weight Catalog Number	Pump End Weight Length Inches*	Pump End Weight Weight Pounds*	Motor Weight Catalog Number	Motor Weight Weight Pounds*	Control Box Catalog Number	Control Box Weight Pounds*
5	2 Wire	1/2	13	1	115	5SP4C01MGS	27-1/2	28	L5P4CMGS	18	12	P218-1079C	22		
		1/2	13	1	230	5SP4C02MGS	27-1/2	28	L5P4CMGS	18	12	P218-1080C	22		
		3/4	18	1	230	5SP4D02MGS	32-3/4	34	L5P4DMGS	22	15	P218-1081C	26		
		1	22	1	230	5SP4E02MGS	37	39	L5P4EMGS	25-1/4	17	P218-1082C	29		
		1-1/2	30	1	230	5SP4F02MGS	47	51	L5P4FMGS	32	21	P218-1327C	39		
	3 Wire	1/2	13	1	115	5P4C01MGS	27-1/2	28	L5P4CMGS	18	12	P218-1072C	21	P217-809	3
		1/2	13	1	230	5P4C02MGS	27-1/2	28	L5P4CMGS	18	12	P218-1073C	21	P217-810	3
		3/4	18	1	230	5P4D02MGS	32-3/4	34	L5P4DMGS	22	15	P218-1074C	25	P217-811	3
		1	22	1	230	5P4E02MGS	37	39	L5P4EMGS	25-1/4	17	P218-1075C	28	P217-812	3
		1-1/2	30	1	230	5P4F02MGS	45-1/2	48	L5P4FMGS	32	21	P218-1076C	31	P217-813	6
		1-1/2	30	3	230				L5P4FMGS	32	21	P218-1330C	31	1095-K41	6
		1-1/2	30	3	460				L5P4FMGS	32	21	P218-1279C	33	1096-K33	6
		1-1/2	30	3	575				L5P4FMGS	32	21	S40043	33	**	6
		2	38	1	230				L5P4GMGS	37-3/4	25	P218-1328C	43	P217-814	8
		2	38	3	230				L5P4GMGS	37-3/4	25	P218-1331C	47	1095-K43	6
		2	38	3	460				L5P4GMGS	37-3/4	25	P218-1274C	47	1096-K33	6
		2	38	3	575				L5P4GMGS	37-3/4	25	S30742	47	**	6
7	2 Wire	1/2	10	1	115	7SP4C01MGS	25-1/2	27	L7P4CMGS	16	11	P218-1079C	22		
		1/2	10	1	230	7SP4C02MGS	25-1/2	27	L7P4CMGS	16	11	P218-1080C	22		
		3/4	13	1	230	7SP4D02MGS	29	32	L7P4DMGS	18-1/2	13	P218-1081C	26		
		1	17	1	230	7SP4E02MGS	33-3/4	37	L7P4EMGS	22	15	P218-1082C	29		
		1-1/2	22	1	230	7SP4F02MGS	42-1/2	47	L7P4FMGS	27-1/4	17	P218-1327C	39		
	3 Wire	1/2	10	1	115	7P4C01MGS	25-1/2	27	L7P4CMGS	16	11	P218-1072C	21	P217-809	3
		1/2	10	1	230	7P4C02MGS	25-1/2	27	L7P4CMGS	16	11	P218-1073C	21	P217-810	3
		3/4	13	1	230	7P4D02MGS	29	32	L7P4DMGS	18-1/2	13	P218-1074C	25	P217-811	3
		1	17	1	230	7P4E02MGS	33-3/4	37	L7P4EMGS	22	15	P218-1075C	28	P217-812	3
		1-1/2	22	1	230	7P4F02MGS	41	44	L7P4FMGS	27-1/4	17	P218-1076C	31	P217-813	6
		1-1/2	22	3	230				L7P4FMGS	27-1/4	17	P218-1330C	33	1095-K41	6
		1-1/2	22	3	460				L7P4FMGS	27-1/4	17	P218-1279C	33	1096-K33	6
		1-1/2	22	3	575				L7P4FMGS	27-1/4	17	S40043	33	**	6
		2	28	1	230				L7P4GMGS	32-1/2	20	P218-1328C	43	P217-814	8
		2	28	3	230				L7P4GMGS	32-1/2	20	P218-1331C	47	1095-K43	6
		2	28	3	460				L7P4GMGS	32-1/2	20	P218-1274C	47	1096-K33	6
		2	28	3	575				L7P4GMGS	32-1/2	20	S30742	47	**	6
		3	36	1	230				L7P4HMGS	39-1/2	24	P218-1450C	53	P217-815	9
		3	36	3	230				L7P4HMGS	39-1/2	24	P218-1441C	53	1095-K52	6
		3	36	3	460				L7P4HMGS	39-1/2	24	P218-1452C	53	1096-K37	6
		3	36	3	575				L7P4HMGS	39-1/2	24	S30744	53	**	6

*Length and Weight are approximate.
**Consult Factory.
TrimLine™ version maximum outside diameter 3-3/4". Standard version maximum outside diameter 3-7/8".
NOTE: Motor, Control Box or Magnetic Starter must be ordered separately.
Discharge NPT is 1-1/4".

HOW TO INSTALL AND OPERATE
PUMPTEC-PLUS

Congratulations on your purchase of a Franklin Electric pump protection system. PUMPTEC-PLUS is the most sophisticated pump protection product on the market today. It is designed to work on *any* 230 vac single phase induction motor (PSC, CSCR, CSIR, and split phase) ranging in size from 1/2 to 5 horsepower.

Your pump protection unit uses a micro-computer to continuously monitor motor power and line voltage to provide protection against dry well, waterlogged tank, high or low line voltage and mud or sand clogging. Indicator lights provide complete system status and are easily viewed without removing the cover. A 5 horsepower rated contactor is included with the unit. The control box provides large terminal blocks and plenty of room for wiring even when using # 2 wire.

Our unique SNAPSHOT calibration feature provides simple, reliable push button calibration.

Please read these instructions carefully before beginning installation.

FEATURES

- ❑ OVER/UNDER LOAD PROTECTION
- ❑ OVER/UNDER VOLTAGE PROTECTION
- ❑ RAPID CYCLE DETECTION
- ❑ FAULT INDICATOR LIGHTS
- ❑ RUN INDICATOR LIGHT
- ❑ 5HP CONTACTOR
- ❑ HEAVY DUTY TERMINAL BLOCKS
- ❑ ADJUSTABLE AUTOMATIC RESTART TIMER
- ❑ SNAPSHOT CALIBRATION
- ❑ CONTINUOUS CALIBRATION MEMORY
- ❑ WORKS WITH ALL SINGLE PHASE MOTORS
- ❑ TRANSIENT SURGE PROTECTION
- ❑ PATENT PENDING
- ❑ UL LISTED (E104778)
- ❑ TOLL FREE CUSTOMER SUPPORT
  (1-800-348-2420)

Franklin Electric

PRE-INSTALLATION INFORMATION

WARNING:
TO AVOID POSSIBLE [illegible]
DISCONNECT POWER AT THE MAIN POWER
PANEL BEFORE INSTALLING, [illegible]
SERVICING [illegible]

CAUTION:
THIS PRODUCT DOES NOT REPLACE A MOTOR CONTROL BOX OR THE NEED FOR MOTOR OVERLOAD PROTECTION. MOTOR OVERLOAD PROTECTION SHOULD BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ARTICLE 430 OR IN ACCORDANCE WITH MOTOR MANUFACTURES RECOMMENDATIONS.

NOTE:
THIS UNIT REQUIRES CALIBRATION BEFORE OPERATION. CALIBRATION IS DESCRIBED IN STEP 7 OF THE INSTALLATION INSTRUCTIONS

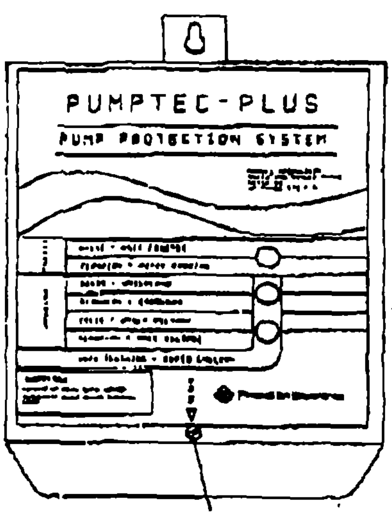
TECHNICAL SPECIFICATIONS

[illegible]

INSTALLATION

STEP 1: REMOVE COVER

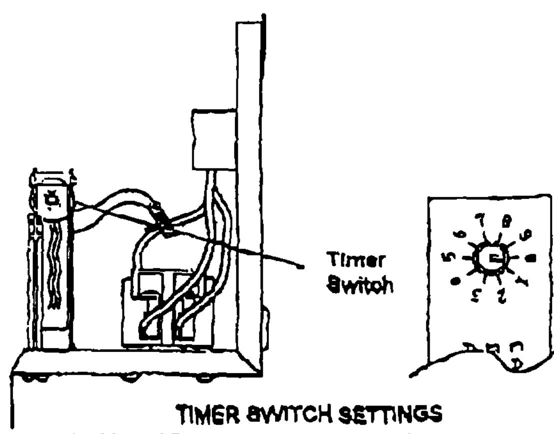
Take off the cover of the PUMPTEC-PLUS by removing the cover screw and sliding the cover up. Place the cover in a safe location.



FRONT COVER SCREW

STEP 2: SET TIMER SWITCH

Set the automatic reset timer switch to the desired reset time. This will set the time after an underload trip condition (dry well condition) has occurred before the PUMPTEC-PLUS will try to restart the motor.



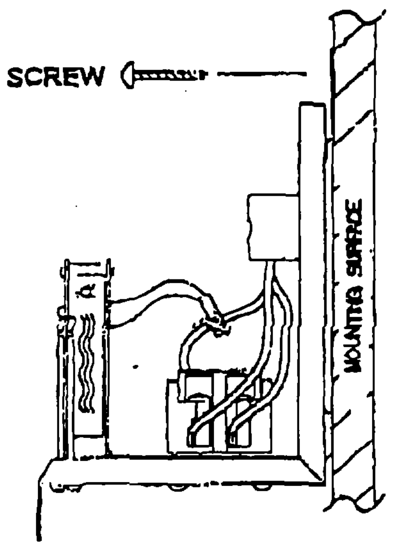
TIMER SWITCH SETTINGS

0) Manual Reset
1) 1 Minute
2) 2 Minutes
3) 4 Minutes
4) 8 Minutes
5) 16 Minutes
6) 32 Minutes
7) 1 Hour 4 Minutes
8) 2 Hours 8 Minutes
9) 4 Hours 16 Minutes

INSTALLATION INSTRUCTIONS (CONTINUED)

STEP 3: MOUNT UNIT

Mount the PUMPTEC-PLUS unit in a location convenient for wiring, preferably not exposed to direct sunlight or rain.

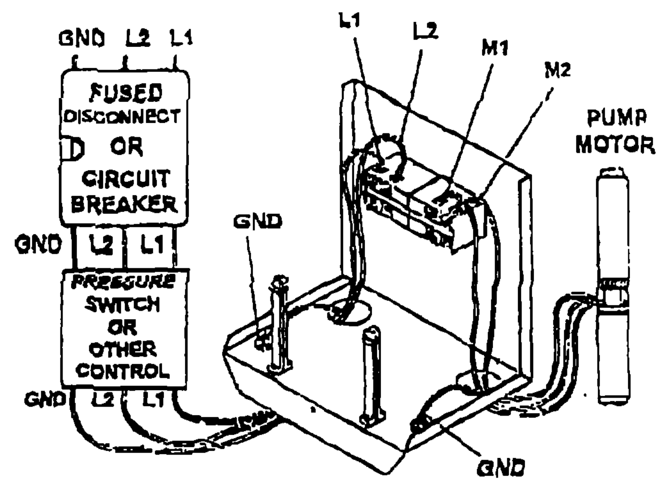


WARNING
Disconnect power at the main panel before installing, wiring or servicing this control.
Serious or fatal shock may occur if power is not disconnected.

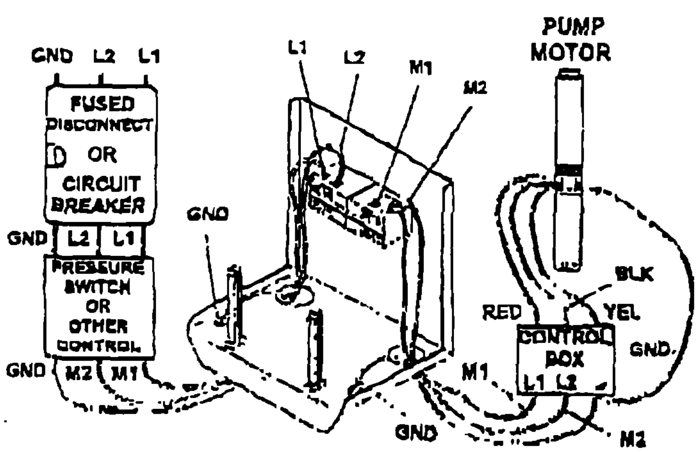
STEP 4: CONNECT POWER AND MOTOR

Check to make sure the 230 volt power has been disconnected. Connect PUMPTEC-PLUS to the pump motor and the 230 volt AC line according to one of the figures below. PUMPTEC-PLUS may be wired into the circuit before or after the pressure or float switch.

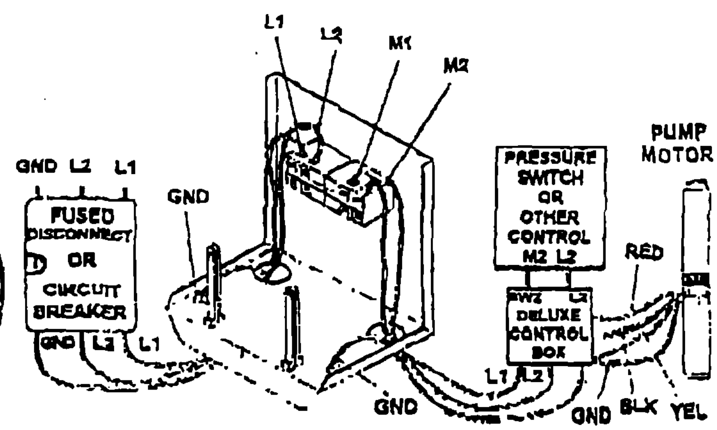
2-WIRE INSTALLATION



3-WIRE INSTALLATION



3-WIRE INSTALLATION WITH A DELUXE CONTROL BOX



INSTALLATION INSTRUCTIONS (CONTINUED)

STEP 5: REPLACE COVER

Replace cover and secure with screw provided.

STEP 6: APPLY POWER

Turn on the 230 volt AC power. Once power is applied the PUMPTEC-PLUS unit should trip indicating an overload condition (blinking yellow light) when the pump tries to run. This is normal and is a reminder that *PUMPTEC-PLUS requires calibration.*

NOTE: Some 1/2 HP motors will not trip in an overload condition upon the initial application of power. The green run indicator light will blink instead. This is also a normal condition. Proceed to step seven.

STEP 7: CALIBRATE

Before the PUMPTEC-PLUS unit is ready for use it **MUST BE CALIBRATED.** The calibration process is quick and is as simple as taking a SNAPSHOT. Calibration may be performed as many times as desired by following the steps below.

CALIBRATE (continued)

A. Press and hold in the reset button on the bottom of the PUMPTEC-PLUS enclosure until the green, yellow and red lights blink alternately. This should take approximately 10 seconds. You will hear the PUMPTEC-PLUS contactor engage and the pump motor should start. Release the reset button. Steps B and C must be completed with in three minutes or the calibration process will be aborted.

B. Verify that the pump system is running normally (i.e. the system is pumping water and the motor current is normal). Try to achieve maximum water flow rate. Calibration on a fully recovered well is recommended.

C. Briefly press the reset switch again and then release it. You have just taken a SNAPSHOT of the motor load. All indicator lights will go off. After 2 to 3 seconds, the green light will start flashing indicating the system is running normally and calibration is complete. Over/under load trips will occur at 125% and 75% of the SNAPSHOT load.

NOTE: CONTINUOUS MEMORY HOLDS CALIBRATION SNAPSHOT EVEN IF POWER IS REMOVED.

CAUTION : PUMPTEC-PLUS should only be calibrated by qualified service personnel. Calibration on a faulty pump system will not provide protection.

OPERATING INSTRUCTIONS

Under normal operating conditions PUMPTEC PLUS requires no special attention. The power line voltage and motor power draw are continuously measured. If a fault condition is detected, an indication is given by a light on the front panel and the motor is disconnected from the power line.

PUMPTEC-PLUS measures the actual motor power (watts) not motor amps or power factor. The motor power draw at the moment of calibration is permanently memorized by PUMPTEC-PLUS. If the motor power draw differs from the memorized calibration power by more than ± 25 %, PUMPTEC PLUS will turn off the pump motor. It is very important to make sure the pump system is running normally during the calibration process.

The figure below shows an illustration of PUMPTEC-PLUS. There are three indicator lights (A, B and C) visible through the front cover. Each light is a different color and has a special meaning. Also, on the bottom of the PUMPTEC PLUS enclosure there is a reset button (D). The meaning of each light and the operation of the reset button are described below.

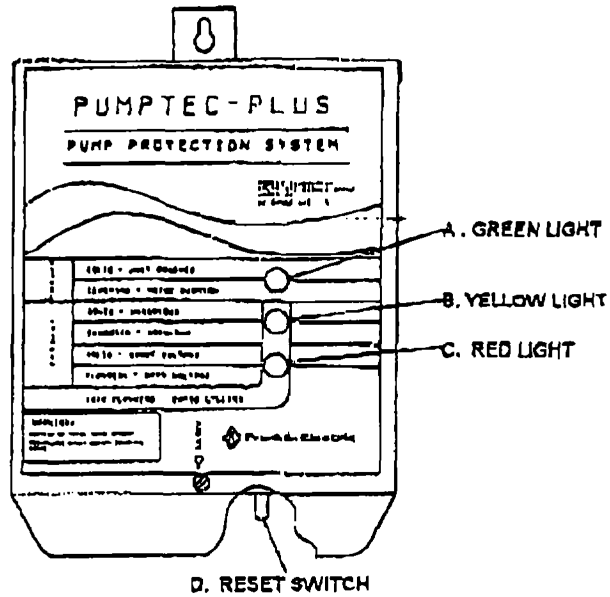
OPERATING INSTRUCTIONS (CONTINUED)

THE GREEN LIGHT (A)

The green light (A) indicates that the status of the pumping system is normal.

A FLASHING GREEN LIGHT indicates the pump motor is running normally and drawing the proper amount of power.

A SOLID GREEN LIGHT indicates that PUMPTEC PLUS has power and that the contactor to the motor is closed but the motor is not running. This may happen when the pressure switch is wired in down line from PUMPTEC-PLUS and the switch is open. PUMPTEC-PLUS is waiting for the pressure switch to close.



THE YELLOW LIGHT (B)

The yellow light (B) indicates that a load fault has occurred.

A FLASHING YELLOW LIGHT indicates that an overload condition has occurred. This means that the pump system power draw was greater than the normal operating power (calibration) by more than 25% for more than 2.5 seconds. PUMPTEC PLUS will not try to run the pump system again until the RESET button (D) is pressed.

A SOLID YELLOW LIGHT indicated that an underload fault has occurred. The PUMPTEC PLUS automatic restart timer will restart the motor in accordance with the position of the automatic restart timer switch setting. This switch should be set at the time of installation. If set in the MANUAL position, PUMPTEC PLUS must be reset manually by pushing the RESET button (D).

THE RED LIGHT (C)

The red light (C) indicates a line voltage fault has occurred and PUMPTEC has turned off the pump motor.

A FLASHING RED LIGHT indicates that an over voltage condition (line > 253 VAC) has existed for more than 2.5 seconds. PUMPTEC PLUS will automatically try to restart the motor again within two minutes. The RESET button (D) may also be pressed to clear this condition.

A SOLID RED LIGHT indicates than an under voltage condition (line < 207 VAC) has existed for more than 2.5 seconds. PUMPTEC PLUS will automatically try to restart the pump motor again within two minutes. The reset button (D) may also be pressed to clear this condition.

RED AND YELLOW FLASHING LIGHTS (B & C)

If the **RED** and **YELLOW** lights (B&C) are flashing on and off together, a rapid cycle condition has been detected. A rapid cycle condition is defined as more than 4 pump motor starts per minute. This condition requires a manual reset which is initiated by pressing the RESET button (D).

THE RESET BUTTON (D)

The reset button is used to restart the PUMPTEC-PLUS from any tripped condition. Simply press and release the button and release. If the fault condition is still present the unit will trip again.

TROUBLE SHOOTING DURING INSTALLATION

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit Appears Dead (NO LIGHTS)	NO POWER TO UNIT	Check wiring. Power supply voltage should be applied to the L1 and L2 terminals of the PUMPTEC-PLUS. In some installations the pressure switch or other control device is wired to the input of the PUMPTEC-PLUS. Make sure this switch is closed.
Flashing Yellow Light	UNIT NEEDS TO BE CALIBRATED	PUMPTEC-PLUS is calibrated at the factory so that it will overload on most pump systems when the unit is first installed. This overload condition is a reminder that the PUMPTEC-PLUS unit requires calibration before use. See step 7 of the Installation Instructions.
	MISCALIBRATED	PUMPTEC-PLUS should be calibrated on a fully recovered well with maximum water flow. Flow restrictors are not recommended.
Flashing Yellow Light During Calibration	TWO WIRE MOTOR	Step C of the calibration instructions indicates that a flashing green light condition will occur 2 to 3 seconds after taking the SNAPSHOT of the motor load. On some two wire motors the yellow light will flash instead of the green light. Press and release the reset button. The green should start flashing.
Flashing Red and Yellow Lights	POWER INTERRUPTION	During the installation of PUMPTEC-PLUS power may be switched on and off several times. If power is cycled more than four times within a minute PUMPTEC-PLUS will trip on rapid cycle. Press and release the reset button to restart the unit.
	FLOAT SWITCH	A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on two wire motors. Try to reduce water splashing or use a different switch.
Flashing Red Light	HIGH LINE VOLTAGE	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
	UNLOADED GENERATOR	If you are using a generator the line voltage may become too high when the generator unloads. PUMPTEC-PLUS will not allow the motor to turn on again until the line voltage returns to normal. Over voltage trips will also occur if the line frequency drops too far below 60 hZ.
Solid Red Light	LOW LINE VOLTAGE	The line voltage is below 207 volts. Check line voltage.
	LOOSE CONNECTIONS	Check for loose connections which may cause voltage drops.
	LOADED GENERATOR	If you are using a generator the line voltage may become too low when the generator loads. PUMPTEC-PLUS will trip on undervoltage if the generator voltage drops below 207 volts for more than 2.5 seconds. Under voltage trips will also occur if the line frequency rises too far above 60 hZ.

TROUBLE SHOOTING AFTER INSTALLATION

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Solid Yellow Light	DRY WELL	Wait for the automatic restart timer to time out. During the time out period the well should recover and fill with water. If the automatic reset timer switch is set to the manual position, then the reset button must be pressed to reactivate the unit.
	BLOCKED INTAKE	Clean or replace pump intake screen.
	BLOCKED DISCHARGE	Remove blockage in plumbing.
	CHECK VALVE STUCK	Replace check valve.
	BROKEN SHAFT	Replace broken parts.
	SEVERE RAPID CYCLING	Machine gun rapid cycling can cause an underload condition. See flashing red and yellow lights section below.
	WORN PUMP	Replace worn pump parts and recalibrate.
Flashing Yellow Light	STALLED MOTOR	Repair or replace pump motor. Pump may be sand or mud locked.
	FLOAT SWITCH	A bobbing float switch can cause two wire motors to stall. Arrange plumbing to avoid splashing water. Replace float switch.
	GROUND FAULT	Check insulation resistance on motor and control box cable.
Solid Red Light	LOW LINE VOLTAGE	The line voltage is below 207 volts. PUMPTEC-PLUS will try to restart the motor every two minutes until line voltage is normal.
	LOOSE CONNECTIONS	Check for excessive voltage drops in the system electrical connections (i.e. circuit breakers, fuse clips, pressure switch, and PUMPTEC-PLUS L1 and L2 terminals). Repair Connections.
Flashing Red Light	HIGH LINE VOLTAGE	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
Flashing Red and Yellow Lights	RAPID CYCLE	The most common cause for the rapid cycle condition is a waterlogged tank. Check for a ruptured bladder in the water tank. Check the air volume control or snifter valve for proper operation. Check setting on the pressure switch and examine for defects.
	LEAKY WELL SYSTEM	Replace damaged pipes or repair leaks.
	STUCK CHECK VALVE	Failed valve will not hold pressure. Replace Valve.
	FLOAT SWITCH	Press and release the reset button to restart the unit. A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on two wire motors. Try to reduce water splashing or use a different switch.

WARRANTY

Franklin Electric warrants to its distributors and original equipment manufacturers that this control will be free of defects in workmanship and materials for a period of one year from date of installation but not more than two years from date of manufacture. This warranty does not cover damage caused by accident, misuse, neglect, improper installation, repair, or alteration.

Franklin Electric will repair or replace at its option any Franklin Electric PUMPTEC-PLUS control that is in breach of the above warranty. These are the sole and exclusive remedies for breach of the warranty. Under no circumstances shall Franklin Electric be liable for any special, incidental or consequential economic damages, resulting from breach of this warranty or any express or implied warranties arising under state law, negligence or otherwise.

This warranty is in lieu of all other warranties, written or oral, statutory, expressed or implied, including any warranty of merchantability or fitness of purpose.

Franklin Electric
Electronic Systems Division
400 East Spring Street
Bluffton, IN 46714

TOLL FREE HELP FROM A FRIEND

Phone Franklin's toll free SERVICE HOTLINE for answers to your installation questions. When you call, a Franklin expert will offer assistance in trouble shooting your pump protection system and provide immediate answers to your motor application questions.

Franklin Electric SERVICE HOTLINE (800) 348-2420

HOW TO INSTALL AND OPERATE

PUMPTEC-PLUS

Congratulations on your purchase of a Franklin Electric pump protection system. PUMPTEC-PLUS is the most sophisticated pump protection product on the market today. It is designed to work on *any* 230 vac single phase induction motor (PSC, CSCR, CSIR, and split phase) ranging in size from 1/2 to 5 horsepower.

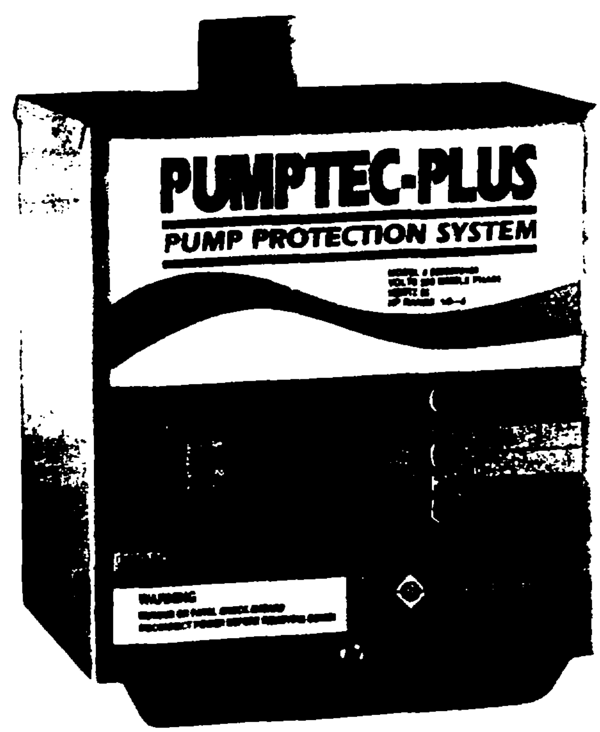
Your pump protection unit uses a micro-computer to continuously monitor motor power and line voltage to provide protection against dry well, waterlogged tank, high or low line voltage and mud or sand clogging. Indicator lights provide complete system status and are easily viewed without removing the cover. A 5 horsepower rated contactor is included with the unit. The control box provides large terminal blocks and plenty of room for wiring even when using # 2 wire.

Our unique SNAPSHOT calibration feature provides simple, reliable push button *calibration.*

Please read these instructions carefully before beginning installation.

FEATURES

- ❑ OVER/UNDER LOAD PROTECTION
- ❑ OVER/UNDER VOLTAGE PROTECTION
- ❑ RAPID CYCLE DETECTION
- ❑ FAULT INDICATOR LIGHTS
- ❑ RUN INDICATOR LIGHT
- ❑ 5HP CONTACTOR
- ❑ HEAVY DUTY TERMINAL BLOCKS
- ❑ ADJUSTABLE AUTOMATIC RESTART TIMER
- ❑ SNAPSHOT CALIBRATION
- ❑ CONTINUOUS CALIBRATION MEMORY
- ❑ WORKS WITH ALL SINGLE PHASE MOTORS
- ❑ TRANSIENT SURGE PROTECTION
- ❑ PATENT PENDING
- ❑ UL LISTED (E104778)
- ❑ TOLL FREE CUSTOMER SUPPORT (1-800-348-2420)



Franklin Electric

PRE-INSTALLATION INFORMATION

WARNING:
TO AVOID POSSIBLE FATAL SHOCK, DISCONNECT POWER AT THE MAIN POWER PANEL BEFORE INSTALLING, WIRING OR SERVICING PUMPTEC-PLUS

CAUTION:
THIS PRODUCT DOES NOT REPLACE A MOTOR CONTROL BOX OR THE NEED FOR MOTOR OVERLOAD PROTECTION. MOTOR OVERLOAD PROTECTION SHOULD BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ARTICLE 430 OR IN ACCORDANCE WITH MOTOR MANUFACTURES RECOMMENDATIONS

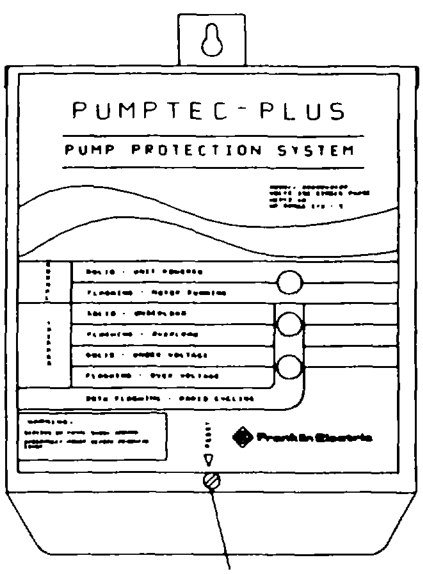
NOTE:
THIS UNIT REQUIRES CALIBRATION BEFORE OPERATION. CALIBRATION IS DESCRIBED IN STEP 7 OF THE INSTALLATION INSTRUCTIONS.

TECHNICAL SPECIFICATIONS

INSTALLATION

STEP 1: REMOVE COVER

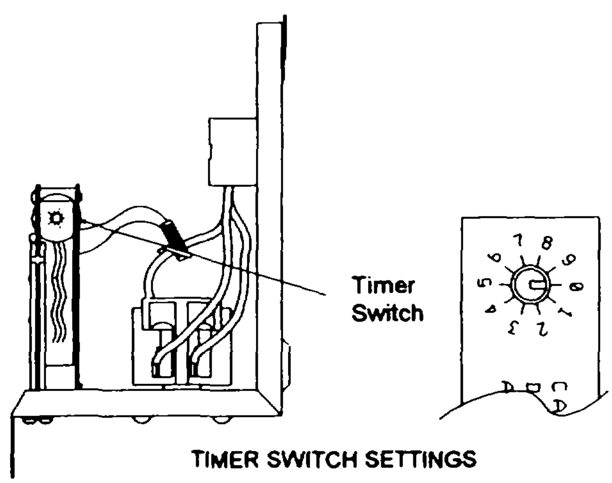
Take off the cover of the PUMPTEC-PLUS by removing the cover screw and sliding the cover up. Place the cover in a safe location.



FRONT COVER SCREW

STEP 2: SET TIMER SWITCH

Set the automatic reset timer switch to the desired reset time. This will set the time after an underload trip condition (dry well condition) has occurred before the PUMPTEC-PLUS will try to restart the motor.



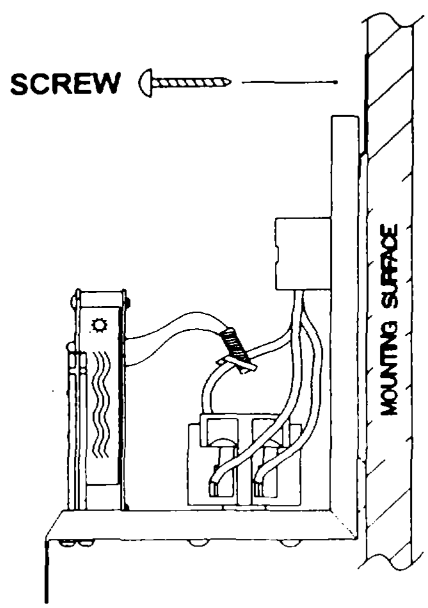
TIMER SWITCH SETTINGS

0) Manual Reset	5) 16 Minutes
1) 1 Minute	6) 32 Minutes
2) 2 Minutes	7) 1 Hour 4 Minutes
3) 4 Minutes	8) 2 Hours 8 Minutes
4) 8 Minutes	9) 4 Hours 16 Minutes

INSTALLATION INSTRUCTIONS (CONTINUED)

STEP 3: MOUNT UNIT

Mount the PUMPTEC-PLUS unit in a location convenient for wiring, preferably not exposed to direct sunlight or rain.

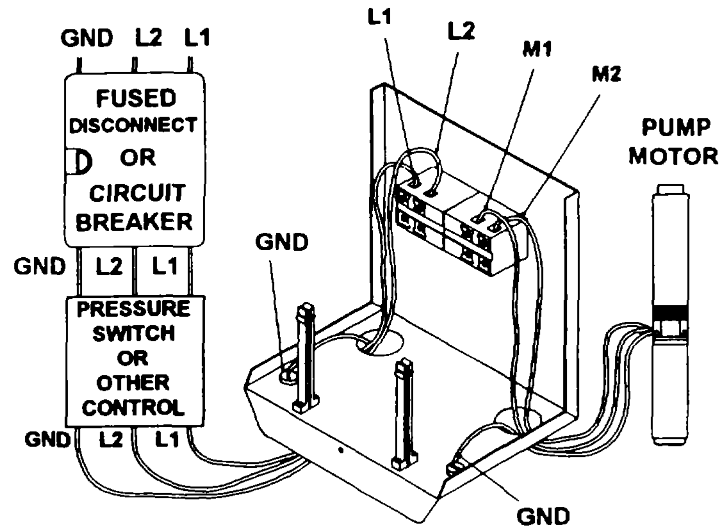


WARNING
Disconnect power at the main panel before installing, wiring or servicing this control.
Serious or fatal shock may occur if power is not disconnected.

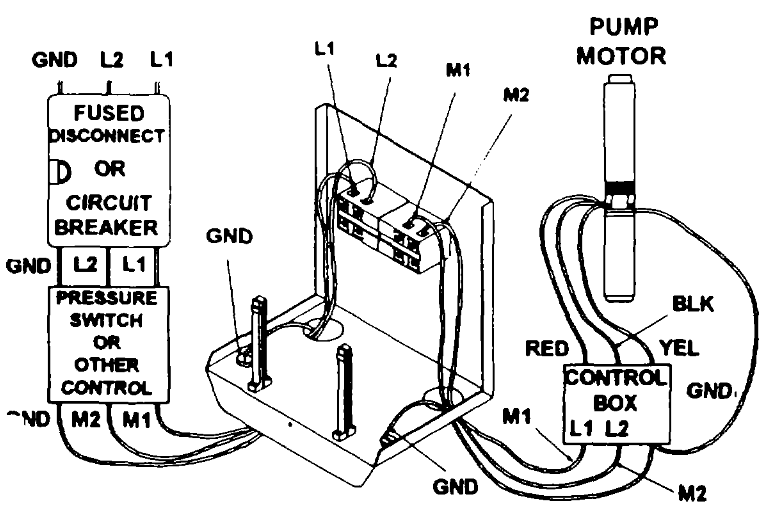
STEP 4: CONNECT POWER AND MOTOR

Check to make sure the 230 volt power has been disconnected. Connect PUMPTEC-PLUS to the pump motor and the 230 volt AC line according to one of the figures below. PUMPTEC-PLUS may be wired into the circuit before or after the pressure or float switch.

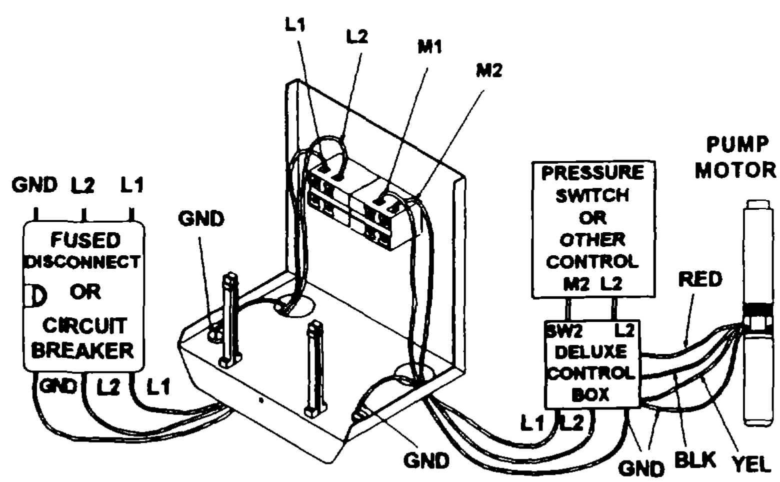
2-WIRE INSTALLATION



3-WIRE INSTALLATION



3-WIRE INSTALLATION WITH A DELUXE CONTROL BOX



INSTALLATION INSTRUCTIONS (CONTINUED)

STEP 5: REPLACE COVER

Replace cover and secure with screw provided.

STEP 6: APPLY POWER

Turn on the 230 volt AC power. Once power is applied the PUMPTEC-PLUS unit should trip indicating an overload condition (blinking yellow light) when the pump tries to run. This is normal and is a reminder that PUMPTEC-PLUS requires calibration.

NOTE: Some 1/2 HP motors will not trip in an overload condition upon the initial application of power. The green run indicator light will blink instead. This is also a normal condition. Proceed to step seven.

STEP 7: CALIBRATE

Before the PUMPTEC-PLUS unit is ready for use it **MUST BE CALIBRATED**. The calibration process is quick and is as simple as taking a SNAPSHOT. Calibration may be performed as many times as desired by following the steps below.

CALIBRATE (continued)

A. Press and hold in the reset button on the bottom of the PUMPTEC-PLUS enclosure until the green, yellow and red lights blink alternately. This should take approximately 10 seconds. You will hear the PUMPTEC-PLUS contactor engage and the pump motor should start. Release the reset button. Steps B and C must be completed with in three minutes or the calibration process will be aborted.

B. *Verify that the pump system is running normally* (i.e. the system is pumping water and the motor current is normal). Try to achieve maximum water flow rate. Calibration on a fully recovered well is recommended.

C. Briefly press the reset switch again and then release it. You have just taken a SNAPSHOT of the motor load. All indicator lights will go off. After 2 to 3 seconds, the green light will start flashing indicating the system is running normally and calibration is complete. Over/under load trips will occur at 125% and 75% of the SNAPSHOT load.

NOTE: CONTINUOUS MEMORY HOLDS CALIBRATION SNAPSHOT EVEN IF POWER IS REMOVED.

CAUTION : PUMPTEC-PLUS should only be calibrated by qualified service personnel. Calibration on a faulty pump system will not provide protection.

OPERATING INSTRUCTIONS

Under normal operating conditions PUMPTEC PLUS requires no special attention. The power line voltage and motor power draw are continuously measured. If a fault condition is detected, an indication is given by a light on the front panel and the motor is disconnected from the power line.

PUMPTEC-PLUS measures the actual motor power (watts) not motor amps or power factor. The motor power draw at the moment of calibration is permanently memorized by PUMPTEC-PLUS. If the motor power draw differs from the memorized calibration power by more than ± 25 %, PUMPTEC PLUS will turn off the pump motor. It is very important to make sure the pump system is running normally during the calibration process.

The figure below shows an illustration of PUMPTEC-PLUS. There are three indicator lights (A, B and C) visible through the front cover. Each light is a different color and has a special meaning. Also, on the bottom of the PUMPTEC PLUS enclosure there is a reset button (D). The meaning of each light and the operation of the reset button are described below.

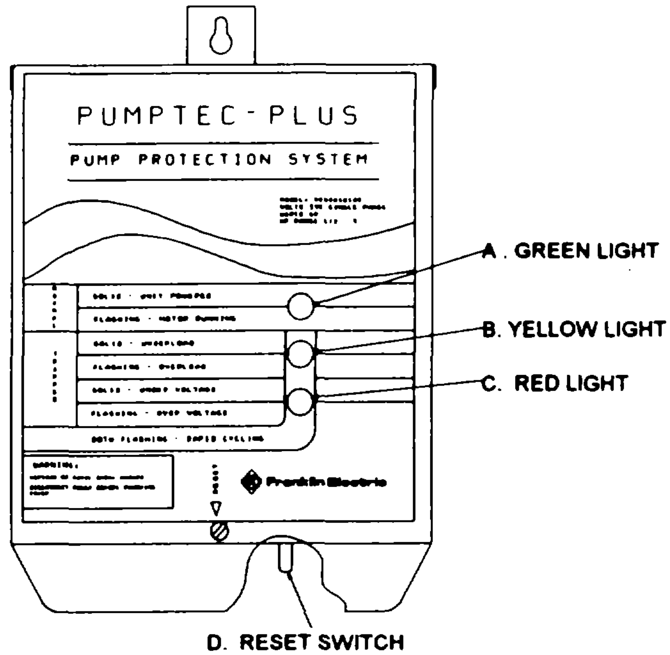
OPERATING INSTRUCTIONS (CONTINUED)

THE GREEN LIGHT (A)

The green light (A) indicates that the status of the pumping system is normal.

A **FLASHING GREEN LIGHT** indicates the pump motor is running normally and drawing the proper amount of power.

A **SOLID GREEN LIGHT** indicates that PUMPTEC PLUS has power and that the contactor to the motor is closed but the motor is not running. This may happen when the pressure switch is wired in down line from PUMPTEC-PLUS and the switch is open. PUMPTEC-PLUS is waiting for the pressure switch to close.



THE YELLOW LIGHT (B)

The yellow light (B) indicates that a load fault has occurred.

A **FLASHING YELLOW LIGHT** indicates that an overload condition has occurred. This means that the pump system power draw was greater than the normal operating power (calibration) by more than 25% for more than 2.5 seconds. PUMPTEC PLUS will not try to run the pump system again until the RESET button (D) is pressed.

A **SOLID YELLOW LIGHT** indicated that an underload fault has occurred. The PUMPTEC PLUS automatic restart timer will restart the motor in accordance with the position of the automatic restart timer switch setting. This switch should be set at the time of installation. If set in the MANUAL position, PUMPTEC PLUS must be reset manually by pushing the RESET button (D).

THE RED LIGHT (C)

The red light (C) indicates a line voltage fault has occurred and PUMPTEC has turned off the pump motor.

A **FLASHING RED LIGHT** indicates that an over voltage condition (line > 253 VAC) has existed for more than 2.5 seconds. PUMPTEC PLUS will automatically try to restart the motor again within two minutes. The RESET button (D) may also be pressed to clear this condition.

A **SOLID RED LIGHT** indicates than an under voltage condition (line < 207 VAC) has existed for more than 2.5 seconds. PUMPTEC PLUS will automatically try to restart the pump motor again within two minutes. The reset button (D) may also be pressed to clear this condition.

RED AND YELLOW FLASHING LIGHTS (B & C)

If the **RED** and **YELLOW** lights (B&C) are flashing on and off together, a rapid cycle condition has been detected. A rapid cycle condition is defined as more than 4 pump motor starts per minute. This condition requires a manual reset which is initiated by pressing the RESET button (D).

THE RESET BUTTON (D)

The reset button is used to restart the PUMPTEC-PLUS from any tripped condition. Simply press and release the button and release. *If the fault condition is still present the unit will trip again.*

TROUBLE SHOOTING DURING INSTALLATION

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit Appears Dead (NO LIGHTS)	NO POWER TO UNIT	Check wiring. Power supply voltage should be applied to the L1 and L2 terminals of the PUMPTEC-PLUS. In some installations the pressure switch or other control device is wired to the input of the PUMPTEC-PLUS. Make sure this switch is closed.
Flashing Yellow Light	UNIT NEEDS TO BE CALIBRATED	PUMPTEC-PLUS is calibrated at the factory so that it will overload on most pump systems when the unit is first installed. This overload condition is a reminder that the PUMPTEC-PLUS unit requires calibration before use. See step 7 of the installation instructions.
	MISCALIBRATED	PUMPTEC-PLUS should be calibrated on a fully recovered well with maximum water flow. Flow restrictors are not recommended.
Flashing Yellow Light During Calibration	TWO WIRE MOTOR	Step C of the calibration instructions indicates that a flashing green light condition will occur 2 to 3 seconds after taking the SNAPSHOT of the motor load. On some two wire motors the yellow light will flash instead of the green light. Press and release the reset button. The green should start flashing.
Flashing Red and Yellow Lights	POWER INTERRUPTION	During the installation of PUMPTEC-PLUS power may be switched on and off several times. If power is cycled more than four times within a minute PUMPTEC-PLUS will trip on rapid cycle. Press and release the reset button to restart the unit.
	FLOAT SWITCH	A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on two wire motors. Try to reduce water splashing or use a different switch.
Flashing Red Light	HIGH LINE VOLTAGE	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
	UNLOADED GENERATOR	If you are using a generator the line voltage may become too high when the generator unloads. PUMPTEC-PLUS will not allow the motor to turn on again until the line voltage returns to normal. Over voltage trips will also occur if the line frequency drops too far below 60 hZ.
Solid Red Light	LOW LINE VOLTAGE	The line voltage is below 207 volts. Check line voltage.
	LOOSE CONNECTIONS	Check for loose connections which may cause voltage drops.
	LOADED GENERATOR	If you are using a generator the line voltage may become too low when the generator loads. PUMPTEC-PLUS will trip on undervoltage if the generator voltage drops below 207 volts for more than 2.5 seconds. Under voltage trips will also occur if the line frequency rises too far above 60 hZ.

TROUBLE SHOOTING AFTER INSTALLATION

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Solid Yellow Light	DRY WELL	Wait for the automatic restart timer to time out. Dunng tne time out period the well should recover and fill with water. If the automatic reset timer switch is set to the manual position, then the reset button must be pressed to reactivate the unit.
	BLOCKED INTAKE	Clean or replace pump intake screen.
	BLOCKED DISCHARGE	Remove blockage in plumbing.
	CHECK VALVE STUCK	Replace check valve.
	BROKEN SHAFT	Replace broken parts.
	SEVERE RAPID CYCLING	Machine gun rapid cycling can cause an underload condition. See flashing red and yellow lights section below.
	WORN PUMP	Replace worn pump parts and recalibrate.
Flashing Yellow Light	STALLED MOTOR	Repair or replace pump motor. Pump may be sand or mud locked.
	FLOAT SWITCH	A bobbing float switch can cause two wire motors to stall. Arrange plumbing to avoid splashing water. Replace float switch.
	GROUND FAULT	Check insulation resistance on motor and control box cable.
Solid Red Light	LOW LINE VOLTAGE	The line voltage is below 207 volts. PUMPTEC-PLUS will try to restart the motor every two minutes until line voltage is normal.
	LOOSE CONNECTIONS	Check for excessive voltage drops in the system electrical connections (i.e. circuit breakers, fuse clips, pressure switch, and PUMPTEC-PLUS L1 and L2 terminals). Repair Connections.
Flashing Red Light	HIGH LINE VOLTAGE	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
Flashing Red and Yellow Lights	RAPID CYCLE	The most common cause for the rapid cycle condition is a waterlogged tank. Check for a ruptured bladder in the water tank. Check the air volume control or snifter valve for proper operation. Check setting on the pressure switch and examine for defects.
	LEAKY WELL SYSTEM	Replace damaged pipes or repair leaks.
	STUCK CHECK VALVE	Failed valve will not hold pressure. Replace Valve.
	FLOAT SWITCH	Press and release the reset button to restart the unit. A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on two wire motors. Try to reduce water splashing or use a different switch.

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Franklin Electric SERVICE HOTLINE (800) 348-2420

MANUFACTURER'S PRODUCT SPECIFICATIONS

Filter Pack Sand

A LEVY Company

THE LEVY CO., INC. PO BOX 540 PORTAGE, INDIANA 46368 (219) 787-8666 FAX (219) 787-8986

17 November 2000

Contract Dewatering
Mr. John Flack
1056 Cardinal Cove
Batazia, Illinois
60510

Dear Mr. Flack:

This is to certify that the Coarse Sand shipped from The Levy Company, St Joseph Materials Plant will meet the following gradation analysis, achieved using ASTM C-136 "*Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate*".

Sieve	Range	Typical
½"	100	100
³/₈"	90-100	99
#4	80-95	89
#8	50-80	66
#16	30-60	45
#30	10-40	24
#50	0-10	5.5
#200	0-3	0.4

Please feel free to contact me at 1-219-881-6544 should any further information be required.

Sincerely,

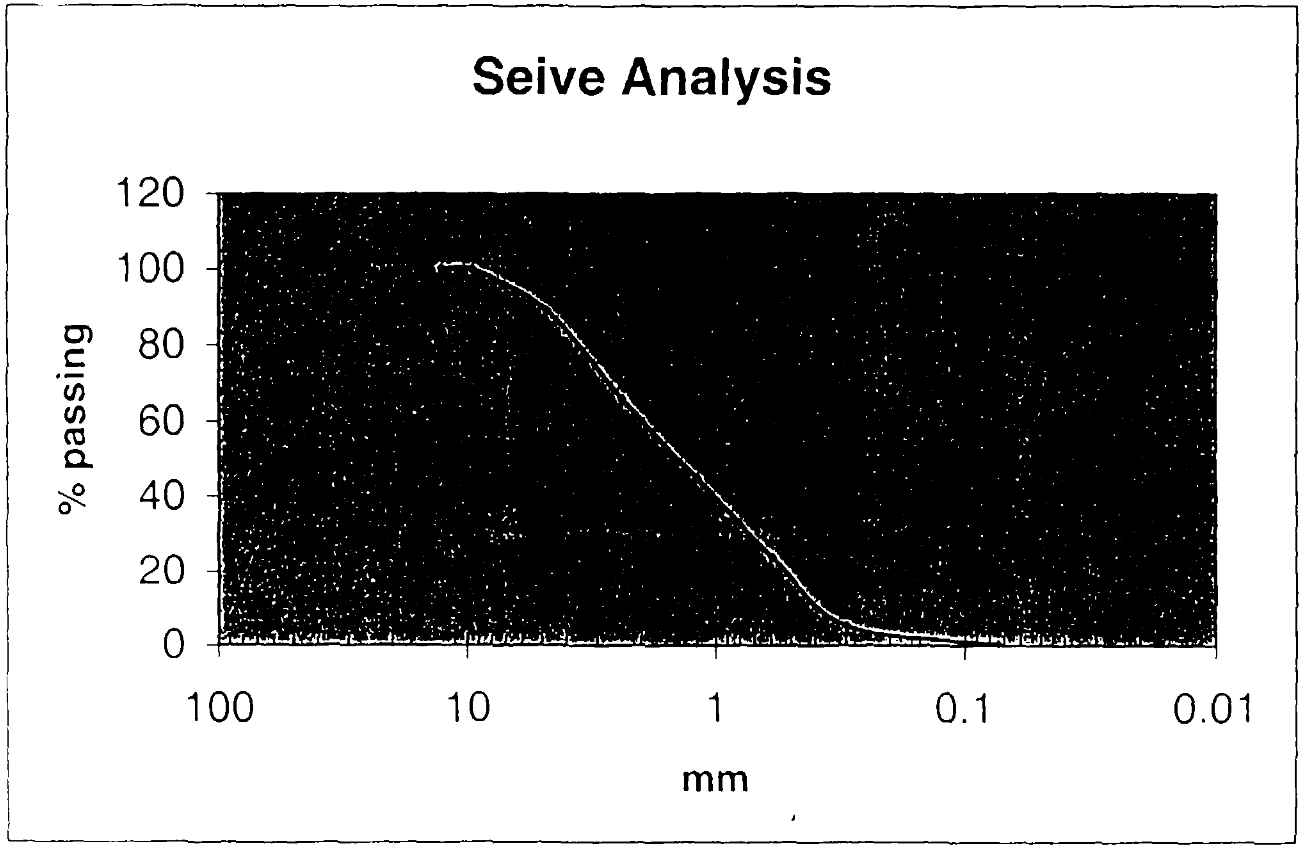
John J. Yzenas Jr.
Technical Services Manager

Cc: Chambers
Decker
Sharratt

ACS Filter Pack for extraction trenches

Percent Passing	100	99.9	89	66	45	24	5.5	0.4
Sieve No.	.5"	3/8"	No.4	No.8	No.16	No.30	No. 50	No.200
inches	0.500	0.375	0.187	0.093	0.047	0.023	0.012	0.003
mm	12.7	9.525	4.7498	2.36474	1.19126	0.58928	0.29718	0.07366

coefficient of uniformity is 6.5
d70 is 2



MANUFACTURER'S PRODUCT SPECIFICATIONS

Groundwater Extraction Piping (HDPE)

Product Notes

Product Note 3.108

Re: Specification for Smooth Interior Corrugated Polyethylene Pipe For Sanitary Sewers
Date: June 1, 1995

This specification applies to high density polyethylene corrugated pipe with an integrally formed smooth interior for use as sanitary sewer pipe. Nominal sizes for which this specification is applicable are 4 - 24 inch diameter Sizes 4 -24 inch (N-12) shall have a full circular cross-section, with an outer corrugated pipe wall and an essentially smooth inner wall (waterway). All sizes shall conform to the AASHTO classification "Type S" (which describes pipe with a smooth waterway)

Pipe manufactured to this specification shall comply with the requirements for test methods, dimensions and markings found in AASHTO Specification M252 and M294. Pipe stiffness values shall be as follows:

Diameter	Pipe Stiffness	Diameter	Pipe Stiffness
4" (100 mm)	50 psi (340 kN/m2)	12" (300 mm)	50 psi (340 kN/m2)
6" (150 mm)	50 psi (340 kN/m2)	15" (375 mm)	42 psi (290 kN/m2)
8" (200 mm)	50 psi (340 kN/m2)	18" (450 mm)	40 psi (280 kN/m2)
10" (250 mm)	50 psi (340 kN/m2)	24" (600 mm)	34 psi (240 kN/m2)

The fittings shall not reduce or impair the overall integrity or function of the pipeline. Common fittings include in-line joint fittings, such as couplers and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. 4" - 24" fittings shall be molded from SDR 35 PVC pipe They shall meet the performance requirements of ASTM D 3034 and the mechanical property requirements of ASTM F1336. The gaskets for these fittings shall be manufactured in accordance with ASTM F477

Installation of this pipe shall be in accordance with ASTM Recommended Practice D2321 as covered elsewhere in these specifications. Maximum allowable deflection shall be 7.5% (per ASTM D3034), measured not less than 30 days following completion of installation.

Pipe and fittings shall be ADS N-12® Series 35 or approved equal

Product Notes

Product Note 3.106 Revised
Re: [illegible]
Date: [illegible]

Introduction
Perforated pipe plays an integral role in many applications of ADS HDPE pipe. Generally perforated pipe is used to accelerate the removal of subsurface water in soils or to allow storm water to percolate into the soil. Currently two classifications of perforations are specified in the AASHTO material specifications for HDPE pipe: Class I and Class II. Class I perforations are commonly used in combination storm/underdrain systems while Class II incorporates leach fields and detention/retention systems. Both classes are explained in more detail in the AASHTO materials specifications (M294, M252 and MP7). AASHTO M252 covers pipe size 3 - 10 inch (75 - 250 mm) while M294 covers 12 – 48 inch (300 - 1200 mm). Currently a provisional specification MP7 covers 54 - 60 inch (1350 - 1500 mm) pipe. ADS manufactures pipe to meet the perforations specified for the project using the patterns indicated as follows.

AASHTO Class I Perforation
The following terminology is derived from the applicable AASHTO specification. ADS manufactures 12 - 24 inch (300 - 600 mm) Class I perforation as a standard product (ADS designation 'C' perforation), however other sizes may be ordered as a made to order with sufficient lead time. The perforations shall be approximately circular and arranged in rows parallel to the axis of the pipe. The locations of the perforations shall be in the valley of the outside corrugation and also in each corrugation. The perforations shall be arranged in two equal groups placed symmetrically on either side of the lower half of the pipe.

Table I

Nominal I.D		Min. No. of Rows of Perforations	Perforation Hole Diameter		"H" Maximum		"L" Minimum		Minimum Inlet Area	
in	mm		in	mm	in	mm	in	mm	in^2/ft	cm^2/m
*4	*100	2	0.375	9.5	1.8	45	2.6	65	4.01	84.97
*6	*150	4	0.375	9.5	2.9	70	3.8	95	6.88	145.6[illegible]
*8	*200	4	0.375	9.5	3.8	94	5.2	130	[illegible]	[illegible]
*10	*250	4	0.375	9.5	4.8	120	6.4	160	[illegible]	[illegible]
12	300	5	0.375	9.5	5.5	138	8.7	[illegible]	4.14	[illegible]
15	375	[illegible]	0.375	9.5	6.9	173	10.6	[illegible]	[illegible]	[illegible]
18	450	6	0.375	9.5	8.3	208	12.5	313	[illegible]	[illegible]
24	600	6	0.375	9.5	11.0	276	15.4	384	2.52	[illegible]
*30	*750	8	0.375	9.5	13.8	345	19.2	480	[illegible]	54.45
*36	*900	9	0.375	9.5	16.6	414	23.0	575	2.06	[illegible]
*42 Type S	*1050	9	0.375	9.5	19.3	[illegible]	26.9	672	2.04	[illegible]
*42 Type D	*1050	**8	0.375	9.5	19.3	[illegible]	26.9	[illegible]	[illegible]	[illegible]
*48 Type D	*1200	**8	0.375	9.5	22.[illegible]	552	[illegible]	766	[illegible]	[illegible]
*60 Type D	*1500	**8	0.375	9.5	27.6	690	38.[illegible]	960	[illegible]	[illegible]

* Denotes perforation pattern made to order
** Spaced at 5" longitudinally for 42" and 48" and 5.5" longitudinally for 60" diameter

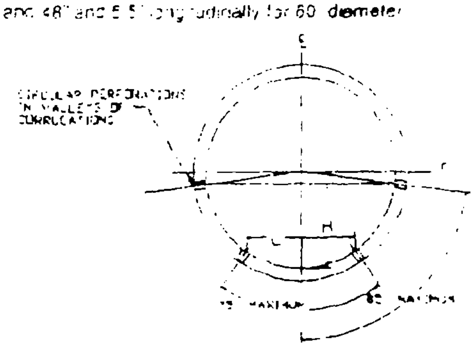


Figure A. Requirements for Perforations

AASHTO Class II Perforation – ADS Standard Perforation

The following terminology for perforations is derived from the applicable AASHTO specification. The perforations shall be circular and/or slotted. The perforations shall be located in the outside valleys of the corrugations. The water inlet area shall be no less than 1.18 in^2/ft (25 cm^2/m) for pipe sizes 4 - 10 inch (100 - 250mm), 1.42 in^2/ft (30 cm^2/m) for pipe sizes 12 - 18 inch (300 - 450 mm) and 1.89 in^2/ft (40 cm^2/m) for pipe sizes larger than 24 inches (450 mm). Table II and the figures below represent ADS standard perforation patterns. Patterns indicated with an asterisk are a made to order product and should allow for additional lead-time when ordering.

Table II

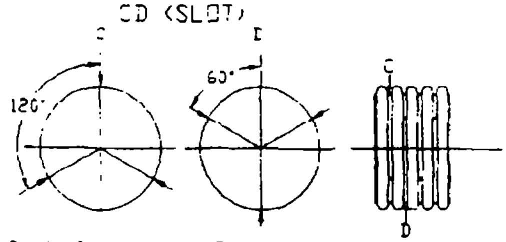
Nominal I.D.		Perforation Type	Slot Length or Diameter		Slot Width		Perforation Config.	Minimum Inlet Area	
in	mm		in	mm	in	mm		in^2/ft	cm^2/m
4	100	Slot	0.875	22.2	0.125	3.18	CD	5.97	126.28
6	150	Slot	0.875	22.2	0.125	3.18	CD	5.11	108.24
8	200	Slot	1.25	31.8	0.125	3.18	CD	5.86	124.03
10	250	Slot	1.25	31.8	0.125	3.18	CD	4.46	94.50
12	300	Circular	0.375	9.52	-	-	E	4.14	87.62
15	375	Circular	0.375	9.52	-	-	E	3.07	64.96
18	450	Circular	0.375	9.52	-	-	E	2.97	62.76
24	600	Circular	0.375	9.52	-	-	F	3.36	71.21
30	750	Circular	0.375	9.52	-	-	H	5.14	108.89
36	900	Circular	0.375	9.52	-	-	H	4.12	87.28
42 Type S	1050	Circular	0.375	9.52	-	-	H	4.08	86.44
*42 Type D	*1050	Circular	0.375	9.52	-	-	**F	2.12	44.86
*48 Type D	*1200	Circular	0.375	9.52	-	-	**F	2.12	44.86
*60 Type D	*1500	Circular	0.375	9.52	-	-	**F	1.93	40.78

* Denotes perforation pattern made to order

** Spaced at 5" longitudinally for 42" and 48" and 5.5" longitudinally for 60" diameter

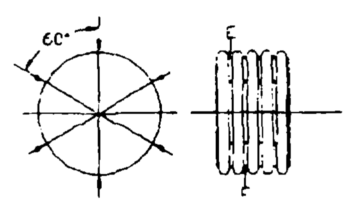
Perforation Configurations

CD (SLOT)



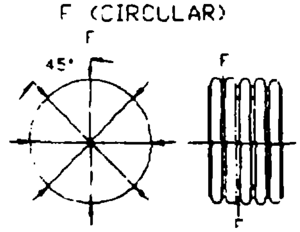
3 at 120°   3 at 120° (60° From C)

E (CIRCULAR)



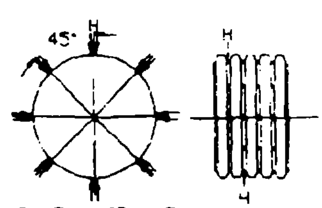
6 AT 60°

F (CIRCULAR)



8 AT 45°

H (CIRCULAR)



2 AT EVERY 45°

ADS N-12® SERIES 35 PRODUCT INFORMATION SHEET

Nominal Diameter	Inside Diameter, Average	Outside Diameter, Average	Wall Thickness, Minimum	Pipe Stiffness @ 5% Deflection	Weight lbs./20 ft. (kg./6 m.)	Area in.^{2}/in.	"I" in.^{4}/in.	"C" in.
4" (100 mm)	4.10" (104 mm)	4.78" (120 mm)	0.020" (0.50 mm)	50 psi (340 kN/m^2)	8.10 lbs. (3.60 kg.)	0.070	0.0014	0.29
6" (150 mm)	6.00" (152 mm)	6.92" (176 mm)	0.020" (0.50 mm)	50 psi (340 kN/m^2)	17.00 lbs. (7.71 kg.)	0.107	0.0036	0.25
8" (200 mm)	7.90" (200 mm)	9.11" (233 mm)	0.025" (0.64 mm)	50 psi (340 kN/m^2)	30.80 lbs. (13.97 kg.)	0.135	0.0070	0.27
10" (250 mm)	9.90" (251 mm)	11.36" (287 mm)	0.025" (0.64 mm)	50 psi (340 kN/m^2)	45.20 lbs. (20.50 kg.)	0.145	0.0110	0.34
12" (300 mm)	12.15" (308 mm)	14.45" (367 mm)	0.035" (0.89 mm)	50 psi (340 kN/m^2)	63.80 lbs. (28.96 kg.)	0.188	0.0410	0.53
15" (375 mm)	14.98" (380 mm)	17.57" (448 mm)	0.035" (0.89 mm)	42 psi (290 kN/m^2)	92.50 lbs. (42.00 kg.)	0.217	0.0660	0.66
18" (450 mm)	18.07" (459 mm)	21.20" (536 mm)	0.050" (1.27 mm)	40 psi (280 kN/m^2)	128.60 lbs. (58.38 kg.)	0.250	0.0890	0.75
24" (600 mm)	24.08" (612 mm)	27.80" (719 mm)	0.050" (1.27 mm)	34 psi (240 kN/m^2)	224.60 lbs. (101.97 kg.)	0.338	0.2310	1.07

Date: June 1, 1995

MANUFACTURER'S PRODUCT SPECIFICATIONS

Geotextile

A complete selection of construction fabrics and geosynthetic products

A Growing Industry

The acceptance and use of geosynthetics in subsurface construction has increased dramatically since their introduction in the 1960s. Growth accelerated in the 1980s with the establishment of minimum performance standards by many federal and state agencies, and the development within the industry of uniform testing methods and measurement criteria.

A Growing Variety of Products

The selection of geosynthetics is constantly expanding with new geometries and material compositions. Standard and specialty products are offered for soil stabilization and reinforcement, erosion control, drainage, filtration, separation, and other construction needs. All geosynthetics are strong, durable, chemically inert, environmentally compatible, and are virtually unaffected by the effects of ground conditions, weather, and aging. Other requirements, such as resistance to creep, temperature, and UV exposure, can be specified.

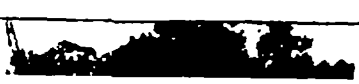
Most geotextile products are manufactured of polypropylene, a tough, lightweight fiber with excellent resistance to abrasion and biological degradation. Other polymers used in geosynthetic production include polyester, high density polyethylene, nylon, and expanded foam polystyrene.

ADS is Your Full-Line Source

A broad selection of geosynthetic products is available from Advanced Drainage Systems, many of which are in stock at our 53 sales and service locations throughout the nation. Whether it's for heavy construction or a home septic system, you'll find the right fabric, grid or composite for the job — along with the world's best selling line of corrugated polyethylene drainage pipe and fittings in 4" through 48" diameters.

Geotextile Applications

	Nonwoven - Needle Punched										Nonwoven - Spunbonded (Typar®)						Woven			
	3300	4000	4420	5000	6600	7000	7700	8800	1020	1220	3151	3201	3341	3401	3601	3801	9440	9530	9750	9670 (Monofilament)
Subgrade Stabilization		•	•	•	•	•	•	•	•						•	•	•	•	•	
Subsurface Drainage	•	•	•	•	•	•						•	•	•						
French Drains	•	•	•	•									•	•						
Soil Reinforcement					•	•	•	•							•	•	•	•		•
Slope Protection		•	•	•	•									•	•	•	•	•		•
Railroad Trackbeds										•										
Landfills (Closure)						•	•	•	•	•						•			•	
Landfills (Expansion)					•	•	•	•	•	•										•
Daily Landfill Covers					•										•			•		
Paved/Unpaved Roads			•	•	•		•	•	•				•	•	•	•		•		
Parking Lots		•	•	•	•		•	•	•				•	•	•	•		•		
Landscaping	•	•	•								•	•	•							•
Septic Fields	•	•									•	•	•							



Erosion Control Under Rip-Rap

Choose the ADS Synthetic envelope that's right for each job.

ADS DRAIN GUARD®

For normal routine installations. Manufactured of 100% nylon, tough and durable DRAIN GUARD WEIGHS just 0.85 ounce per square yard. The material's unique bonding process gives you an ultraporous filter that restrains and stabilizes the soil, yet allows free entry of water.

ADS SOCK

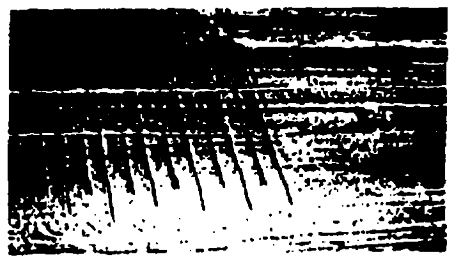
For more rough-and-tumble installations. A polyester machine-knitted envelope that provides the needed water entry and sediment protection. SOCK weighs approximately three ounces per square yard. SOCK stretches to fit snugly over the tubing and gives the extra protection required by rough handling conditions.

For applications in agriculture, highway construction and the building industry, ADS has the synthetic drain envelope for every job.

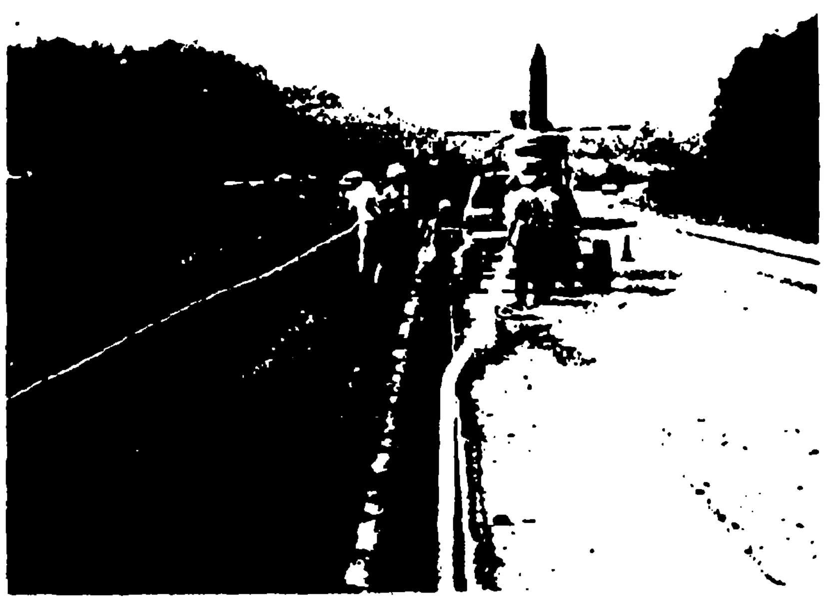
STANDARD FEATURES

ADS DRAIN GUARD and SOCK synthetic wrap materials — admit fine silt and clay; restrain sands and coarse silts — non-toxic, non-irritating — inert in soil — non-biodegradable — resist alkalis and acids — will not rot — not affected by freezing or thawing — continuous lengths up to 5000' — available for drainage tubing sizes from 3" to 24" diameter — factory applied ready for installation — lower labor costs in the field.

Applicable Specifications
SCS Engineering Standards Code 606 — ASTM F405 — ASTM F667 — ASTM F449 — AASHTO M252, M294



Each is strong, non-biodegradable and gives you the excellent filtering and soil stabilizing characteristics you need. Both **DRAIN GUARD** and ADS **SOCK** perform equally well in the ground for the life of your drainage installation. And, because these materials are factory installed on ADS tubing, you'll save valuable labor costs in the field.



Ca. ff Corporation's Drain-Sleeve Specifications

A[illegible] 1996

Description	Regular	Regular & Highway	Regular	Highway	Regular	Highway	Regular	Highway	Super Highway	Regular	Regular	Regular	[illegible]	[illegible]	[illegible]
Color Stripe	white	white	white	blue	orange	yellow	white	[illegible]	black	[illegible]	black	blue	[illegible]	[illegible]	[illegible]
Oz/yd² relaxed	3.20	5.40	3.80	5.40	4.30	5.40	3.30	4.10	4.60	3.50	3.50	3.50	3.50	3.50	3.50
Oz/yd² Applied	2.10	3.50	2.50	3.50	2.80	3.60	2.80	3.50	3.90	3.00	3.00	3.00	3.00	3.00	3.00
Layflat Width															
Inches	5.25	5.50	6.75	6.00	7.00	7.00	10.00	9.75	10.50	14.00	14.00	16.00	25.00	27.50	30.00
mm	133	140	170	152	178	178	255	248	268	355	355	406	635	699	762
Cross Stretch Inches / mm	[illegible]	10 / 254	16 / [illegible]	[illegible]	17.5 / [illegible]	[illegible] / 475	20.5 / [illegible]	[illegible]	[illegible] / 496	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Applied Weight* per 1000'															
lbs	11.0	23.0	25.0	30.0	30.0	36.0	35.0	44.0	53.0	52.0	65.0	81.0	103.0	115.0	150.0
kgs	5.0	10.5	12.0	13.5	13.5	16.3	16.0	20.0	24.0	23.6	30.0	37.0	42.0	52.0	68.0
ft/#	90.0	43.0	40.0	33.0	33.0	27.0	28.0	22.0	19.0	19.0	15.0	12.0	9.0	8.0	6.0

These weights may vary by application procedure and O.D. of pipe

SPECIFICATION	Test Method	Regular Sleeve	Highway Sleeve
Fiber [illegible]		Polyester	Polyester
Weight (Oz/yd²) Applied	ASTM D-3776	2.5-3.5	3.6-3.9
Thickness [illegible] (mm)		.040 (1)	.040 (1)
Mullen Burst, p.s.i. (kpa)	ASTM D-3786	100	135
Puncture Strength [illegible]	ASTM D-4833	N/A	[illegible]
Air Permeability ft³/ft²/min(cm³/cm²/sec)	ASTM D-737	700 (335)	700 (335)
Water flow rate (US gal/min/ft²) [illegible]	[illegible]	700	700
Water Permeability by Permittivity s(-1)	ASTM D-4491	2.4	2.9
AOS US sieve	ASTM D-4751	30	40-50
AOS (mm)	ASTM D-4751	.600	.425-.300
UV Degradation	ASTM D-4355	70%	70%

Specifications are based on independent laboratory studies and are considered to be true and accurate

ECONOMICAL

VERSATILE

EFFECTIVE

2890 Highway 49 North
Concord, NC USA 28025
1-800-845-5184
704-786-3917
Fax 704-788-8514

MANUFACTURER'S PRODUCT SPECIFICATIONS

Manholes and Covers

Kerkstra
Precast, Inc.

CERTIFICATION

This is to certify that all 2' diameter, 3' diameter, 4' diameter, 5' diameter, 6' diameter, 7' diameter and 8' diameter manholes and catch basins manufactured by KERKSTRA PRECAST, INC. for the ______________________________ job meet or exceed ASTMC - 478 requirements.

KERKSTRA PRECAST, INC.

Lawrence Kerkstra, President

CERT.MH

1330 Chicago Dr. • Jenison, Michigan 49428 • (616) 457-4920 • FAX: (616) 457-6440

Kerkstra Precast
O-1330 Chicago Drive
Jenison MI 49428
(616)457-4920
Fax (616)457-6440

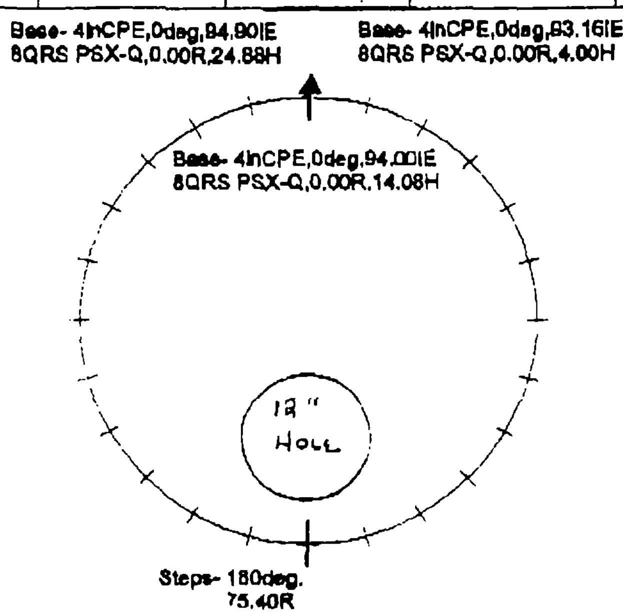
Contractor:	CONTRACT DEWATERING
Project:	GRIFFITH INDIANA
Engineer/Owner:	N/A
Project start date:	12/15/00

Manhole type:	Standard	Cone type:	Eccentric - 24 in	Date:	11/16/00
Manhole diameter:	48 in	Manhole	MHV	Detailer:	PP
Finish elevation:	100.00 ft	Station #:	mhvault PP#:	Angle	Inside
Outlet elevation:	93.16 ft	Manhole Mark:		Base thickness:	6 in
Net depth:	6.84 ft	User Def #1:		Prechanneled:	No
				Sump size:	0.0 ft
				Embedment:	0 in
				Lifting device:	Keylock
				Boltdown casting:	No
				Joint type:	Rubber
				Step type:	Plastic/Steel
				Waterproofing:	Outside
				Casting & adj	1.10 ft
				Casting number:	

Cast/Adj	0.01 ft	24 in
Top	1.00 ft	48 in
Riser 1	2.67 ft	48 in
Base	3.33 ft	48 in

Base type: Integral Step location: 180 Ma [redacted]

Pipe Angle (deg.)	Invert Elevation (ft.)	Pipe Size (in.)	Pipe Type	Boot Type	Part Number	Hole (in.)	"R" (in.)	"H" (in.)
0	93.16	4	CPE	PSX	8QRS PSX-Q	8.00	0.00	4.00
0	94.00	4	CPE	PSX	8QRS PSX-Q	8.00	0.00	14.08
0	94.90	4	CPE	PSX	8QRS PSX-Q	8.00	0.00	24.88



Non-standard height - Cast/Adj
Non-standard height - Riser 1

Contractor:	CONTRACT DEWATERING		
Project:	GRIFFITH INDIANA		
Engineer/Owner:	N/A		
Project start date:	12/15/00		
Manhole type:	Standard	Cone type:	Eccentric - 24 in
Manhole diameter:	48 in	Manhole Number:	MHV
Finish elevation:	100.00 ft	Station #: mhvault	PP#:
Outlet elevation:	93.16 ft	Manhole Mark:	
Net depth:	6.84 ft	User Def #1:	

Kerkstra Precast
O-1330 Chicago Drive
Jenison MI 49428
(616)457-4920
Fax (616)457-6440

Date:	11/16/00
Detailer:	PP
Angle measurement:	Inside
Base thickness:	6 in
Prechanneled:	No
Sump size:	0.0 ft
Embedment:	0 in
Lifting device:	Keylock
Boltdown casting:	No
Joint type:	Rubber
Step type:	Plastic/Steel
Waterproofing:	Outside
Casting & adj maximum:	1.10 ft
Casting number:	

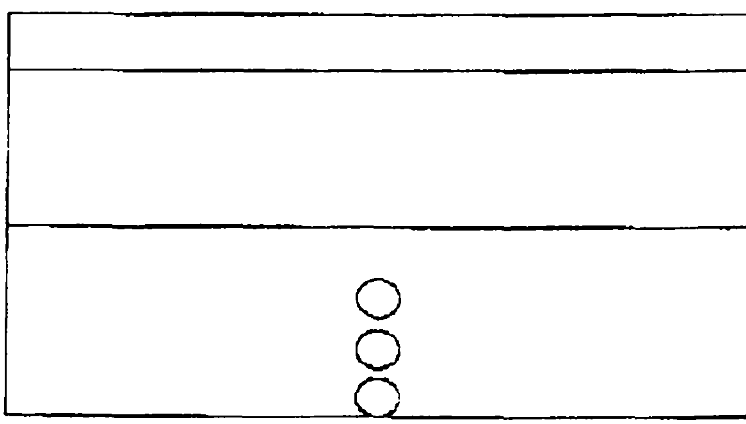
Cast/Adj	0.01 ft	24 in
Top	1.00 ft	48 in
Riser 1	2.67 ft	48 in
Base	3.33 ft	48 in

Base type: Integral

Step location: 180

Manhole Jack
© 1993 [redacted]

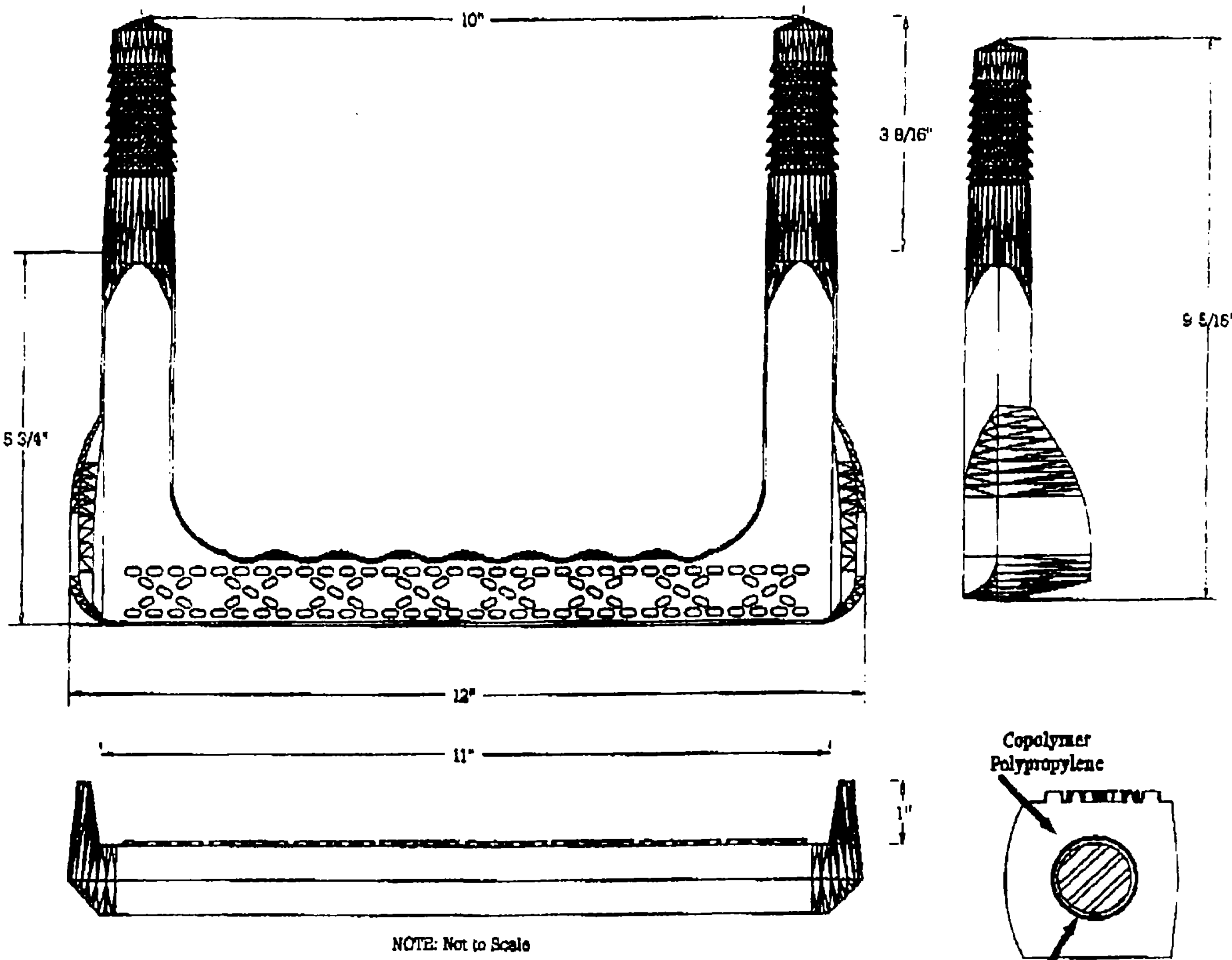
Pipe Angle (deg.)	Invert Elevation (ft.)	Pipe Size (in.)	Pipe Type	Boot Type	Part Number	Hole (in.)	"R" (in.)	"H" (in.)
0	93.16	4	CPE	PSX	BQRS PSX-Q	8.00	0.00	4.00
0	94.00	4	CPE	PSX	BQRS PSX-Q	8.00	0.00	14.08
0	94.80	4	CPE	PSX	BQRS PSX-Q	8.00	0.00	24.88



Base: 3.33 ft

Non-standard height - Cast/Adj
Non-standard height - Riser 1

ML-10



NOTE: Not to Scale

ML-10
Mechanical Lock Installation Methods:
MINIMUM CONCRETE STRENGTH MUST BE 3000 PSI

Preformed Holes:
- Two preformed holes on 10" centers.
- Holes must be parallel.
- Diameters of holes are 1.1" tapering to 7/8" in 3 1/2" of depth.

Drilled Holes:
- Drill two 1" holes on 10" centers with a minimum depth of 3 3/4".
- Use 1" masonry bit for drilling.
- Holes must be parallel.

Drive step with sledge hammer until both legs are completely seated.

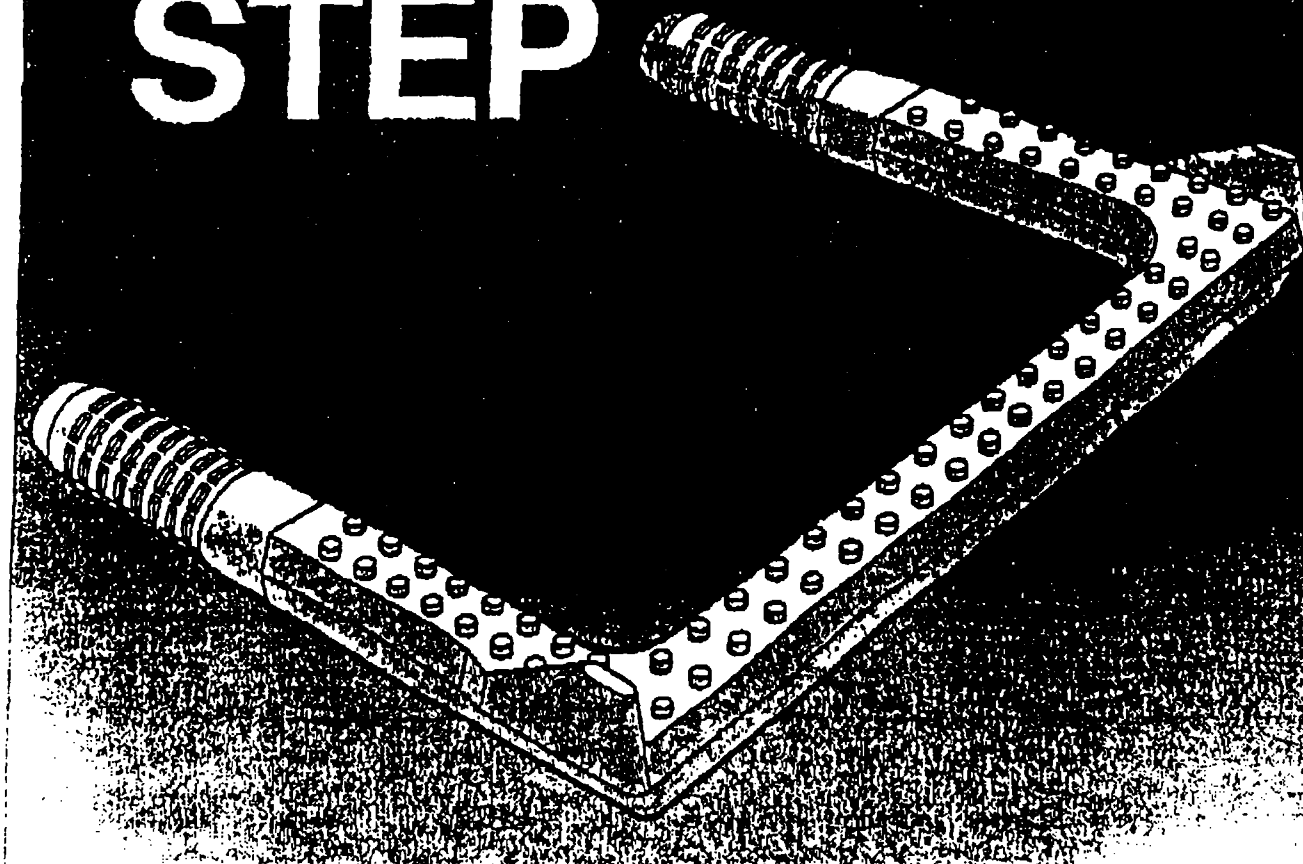
This step meets or exceeds ASTM C-478 and OSHA Standards when properly installed.

6-14-96

AMERICAN Step Company, inc.

800-988-STEP • 770-467-9844 office 770-467-8011 fax
830 East Broadway • P.O. Box 137 • Griffin, GA 30224-0137

10" PLASTIC MANHOLE STEP

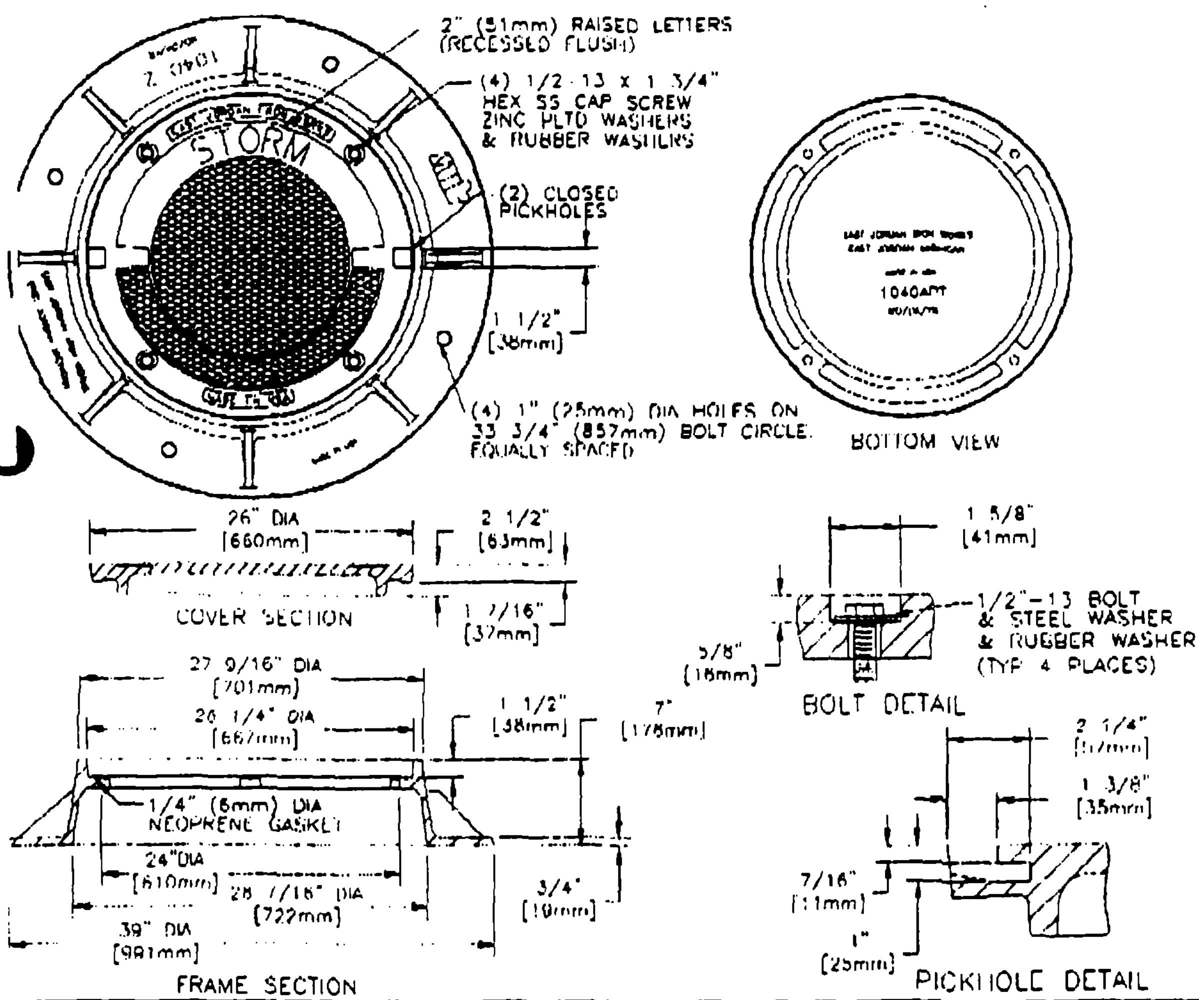


INTRODUCING A UNIQUELY DESIGNED, STEEL REINFORCED, COPOLYMER POLYPROPYLENE, MANHOLE SAFETY STEP.

PS

PRESS-SEAL GASKET CORPORATION
CONCRETE PRODUCTS SUPPLY COMPANY
1-800-348-7325 (219) 436-0521 Fax No. (219) 436-1908
MAIL TO: P.O. BOX 10482 • FORT WAYNE, INDIANA 46852
SHIP TO: 6935 LINCOLN PARKWAY • FORT WAYNE, INDIANA 46804

CPSC



EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 616-536-4458

DRAWN	DATE
FVM	06/25/98
APPROVED	DATE

WATER TIGHT ASSEMBLY

PRODUCT NO.
104186

CATALOG NO.
1040APT
1040ZPT

REF. PRODUCT DRAWING
104011
104246

EST. WT.
COVER: 150 LBS 68kg
FRAME: 230 LBS 104kg
UNIT: 380 LBS 172kg

OPEN AREA
N/A

MAT'L SPEC.
COVER – GRAY IRON ASTM A48 CL35
FRAME – GRAY IRON ASTM A48 CL35

LOAD RATING
HEAVY DUTY

MANUFACTURER'S PRODUCT SPECIFICATIONS

Bentonite

TECHNICAL INFORMATION SHEET

WYO-BEN, INC.
550 South 24th Street West, Suite 201
P. O. Box 1979
Billings, Montana 59103
USA
Tel: 406~652-6351 / Fax: 406~656-0748

WYO-BEN

SUBJECT: **HYDROGEL®**

Sodium bentonite meeting all API Spec. 13A, Section 4 (Fourteenth Ed., May, 1993) requirements.

COLOR: Light Gray

TYPICAL CHEMICAL ANALYSIS:	%
SiO_2	61.4
Al_2O_3	18.1
Fe_2O_3	3.5
Na_2O	2.3
MgO	1.7
CaO	.4
TiO_2	.2
K_2O	.1
Other	.07
H_2O	7.8
L.O.I.	4.4

TRACE METALS:	P.P.M.
Arsenic	0.1
Barium	< 1.0
Cadmium	< 0.01
Chromium	< 0.05
Lead	< 0.1
Mercury	< 0.02
Selenium	< 0.02
Silver	< 0.05

SPECIFIC GRAVITY: 2.55 ± 0.1

pH (5% SUSPENSION): 9.1 ± 0.4

SURFACE AREA (m^2/gm):	
External Surface	82
All Surfaces	800

BULK DENSITY (lbs/ft^3): 52 ± 3

PARTICLE SIZE:
% Passing 200 Mesh Sieve 80% ± 4

TYPICAL CHARACTERISTICS: Criteria (API 13A, Sec. 4 Spec)	Typical Test Results
Viscometer Reading @ 600 R.P.M. - (30 Minimum)	38 ± 4
Barrel Yield	98 ± 4
Water Loss (15.0 Maximum)	13.5 ± 1
Wet Screen Analysis Residue on U.S. Sieve No. 200 (4.0% Maximum)	3.0 ± 0.5
% Moisture	8 ± 2
Gel Strength (10 Seconds)	4 ± 1
Gel Strength (10 Minutes)	12 ± 2
Plastic Viscosity, cps.	13 ± 3
YP/PV Ratio (3.0 Maximum)	1.5 x P.V. ± 0.5
Marsh Funnel Viscosity (Sec.)	45 ± 2
Free Swell	22 Min.

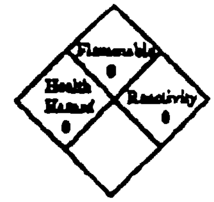
Viscosity, funnel viscosity, yield point, water loss and pH are determined using a suspension of 22.5 grams of bentonite in 350 ml. of distilled water, (6.1% by wt.)

USES:
Oil and gas, mineral and water well drilling, horizontal boring and tunneling, slurry wall construction.

WYO-BEN

WYO-BEN, INC.

MATERIAL SAFETY DATA SHEET



NFPA FIRE HAZARD IDENTIFICATION SYSTEM

I. PRODUCT IDENTIFICATION

Trade Name(s): **HYDROGEL®**

Generic Name(s): Wyoming (Western) Bentonite; Bentonite Clay (CAS No. 1302-78-9)

Chemical Name(s): Sodium Montmorillonite (CAS No. 1318-93-0)

Manufacturer: WYO-BEN, INC. Address: P.O. Box 1979 Billings, Montana 59103	Telephone Numbers: Information: (406) 652-6351 EMERGENCY: (406) 652-6351

II. HAZARDOUS INGREDIENTS

Ingredient	CAS NO.	%	Hazard
Crystalline Silica (SiO_2) as Quartz *See Note*	14808-60-7	See Note	Low concentrations of crystalline silica (SiO_2) in the form of quartz, may be present in airborne bentonite dust. See Section *VI for discussion of health hazard.*

Note: Although the typical quartz content of western bentonite is in the range of 2 to 6%, most of the quartz particles are larger than the 10 Φ respirable threshold size. The actual respirable quartz concentration in airborne bentonite dust will depend upon bentonite source, fineness of product, moisture content of product, local humidity and wind condition at point of use and other use specific factors.

III. PHYSICAL DATA

Boiling Point (EF): NA	Specific Gravity (H_2O=1): 2.45-2.55
Vapor Pressure (mm. Hg): NA	Melting Point: Approx. 1450EC
Vapor Density (Air = 1): NA	Evaporation Rate (Butyl Acetate = 1): NA
Solubility in Water: Insoluble, forms colloidal suspension.	pH: 8-10 (5% aqueous suspension)
Density (at 20E C): 55 lbs/cu.ft. as product.	

Appearance and Odor: Bluegray to green as moist solid, light tan to gray as dry powder. No odor.

IV. FIRE AND EXPLOSION DATA

Flash Point: NA	Flammable Limits: LEL: NA UEL: NA

Special Fire Fighting Procedures: NA

Unusual Fire and Explosion Hazards: None. Product will not support combustion.

Extinguishing Media: None for product. Any media can be used for the packaging. Product becomes slippery when wet.

V. REACTIVITY

Stability: Stable

Hazardous Polymerization: None

Incompatibility: None

Hazardous Decomposition Products: None

NA = Not Applicable ND = Not Determined

Date Prepared: March 11, 1999 Doc #: 10100-01

VI. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:

Skin: Possible drying resulting in dermatitis.

Eyes: Mechanical irritant.

Inhalation: Acute (short term) exposure to dust levels exceeding the PEL may cause irritation of respiratory tract resulting in a dry cough.

Chronic (long term) exposure to airborne bentonite dust containing respirable size (# 10 Φ) quartz particles, where respirable quartz particle levels are higher than TLV's, may lead to development of silicosis or other respiratory problems. Persistent dry cough and labored breathing upon exertion maybe symptomatic.

Ingestion: No adverse effects.

Permissible Exposure Limits: (for air contaminants)	OSHA PEL (8hr. TWA)	ACGIH TLV
Bentonite as "Particulates not otherwise regulated" (formerly nuisance dust)		
Total dust	$15mg/m^3$	ND
Respirable dust	$5mg/m^3$	ND
Crystalline Quartz (respirable)	$0.1mg/m^3$	$0.1mg/m^3$

Carcinogenicity: Bentonite is not listed by NTP or OSHA. IARC, 1997, concludes that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica from occupational sources (IARC Class 1), that carcinogenicity was not detected in all industrial circumstances studied and that carcinogenicity may depend on characteristics of the crystalline silica or on external factors affecting its biological activity.

Acute Oral LD_{50}: ND	Acute Dermal LD_{50}: ND	Aquatic Toxicology LC_{50}: ND

Emergency and First Aid Procedures:

Skin: Wash with soap and water until clean.

Eyes: Flush with water until irritation ceases.

Inhalation: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

VII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Avoid breathing dust; wear respirator approved for silica bearing dust. Vacuum up to avoid generating airborne dust. Avoid using water. Product slippery when wetted.

Waste Disposal Methods: Product should be disposed of in accordance with applicable local, state and federal regulations.

Handling and Storage Precautions: Use NIOSH/MSHA respirators approved for silica bearing dust when free silica containing airborne bentonite dust levels exceed PEL/TLV's. Clean up spills promptly to avoid making dust. Storage area floors may become slippery if wetted.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Mechanical, general room ventilation. Use local ventilation to maintain PEL's/TLV's.

Respirator: Use respirators approved by NIOSH/MSHA for silica bearing dust.

Eye Protection: Generally not necessary. Personal preference.

Gloves: Generally not necessary. Personal preference.

Other Protective Clothing or Equipment: None

IX. SPECIAL PRECAUTIONS

Avoid prolonged inhalation of airborne dust.

DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIAL INFORMATION

Shipping Name: NA (Not Regulated)	Hazard Class: NA
Hazardous Substance: NA	Cautionary Labeling: NA

Date Prepared: March 11, 1999 Doc #: 10100-01

MANUFACTURER'S PRODUCT SPECIFICATIONS

Well Screen

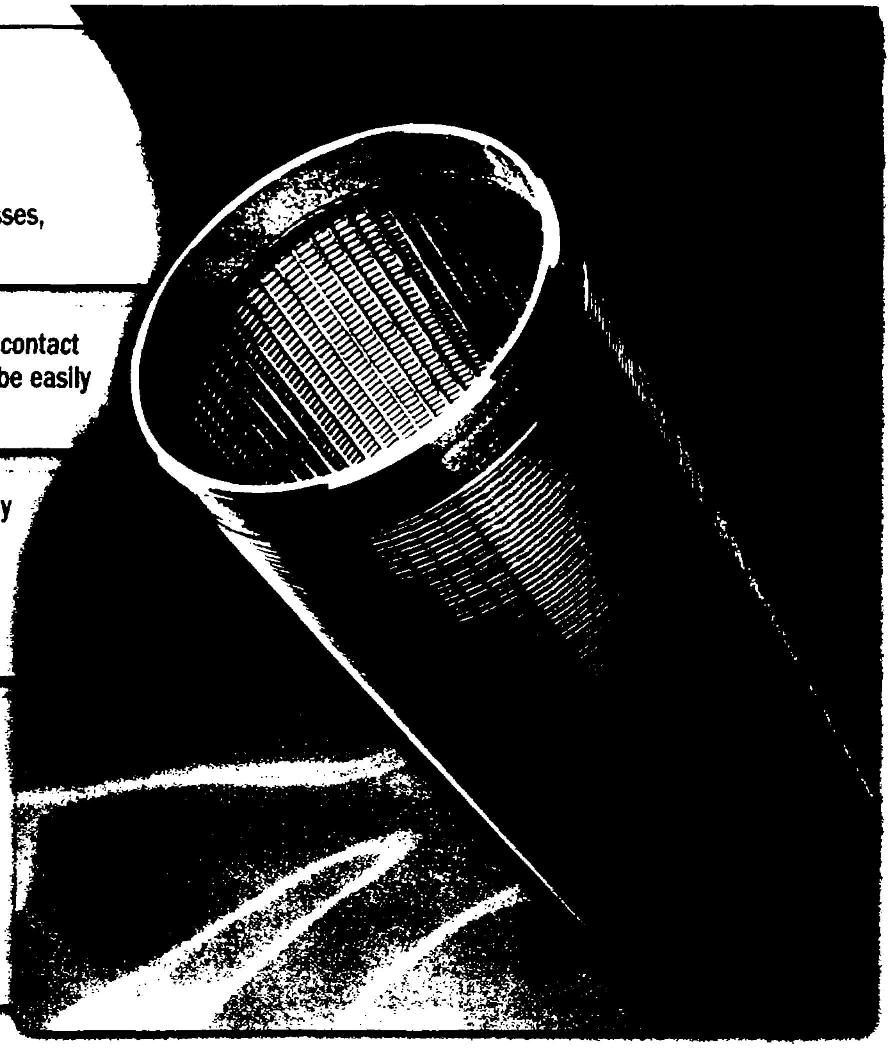
Well Screen Products

Over 120 Years of Leadership and Innovation

Founded in 1879, Cook Screen is the world's oldest manufacturer of continuous-slot, wedge-wire screens for use in highly accurate filtration and separation applications. We have extensive expertise in supplying engineered solutions for a broad range of industries and applications.

PRAM FILTRATION CORP

T. 612-617-4470 F. 612-379-3149
E-mail. sales@pramfiltration.com
Web. www.pramfiltration.com



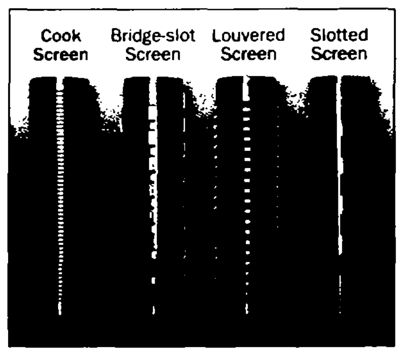
Cook Screen possesses a thorough, real-world understanding of liquid/solid separation processes, applications and solutions.

Our continuous slot screens have only two point contact for retained particles. Fine sand, silt or clay can be easily removed without plugging screen apertures.

Our wedge wire continuous slot screen has a very low pressure drop and exceptionally good development characteristics. Compared to traditional screens, Cook screens can guarantee a smaller and less costly well bore.

Cook Screen's experience and capabilities enable the use of virtually any weldable materials, including most grades of stainless steel, low-carbon steel, titanium, alloy 20 and other alloys. Our premier quality, process application knowledge and engineering expertise support unlimited application and manufacturing capabilities.

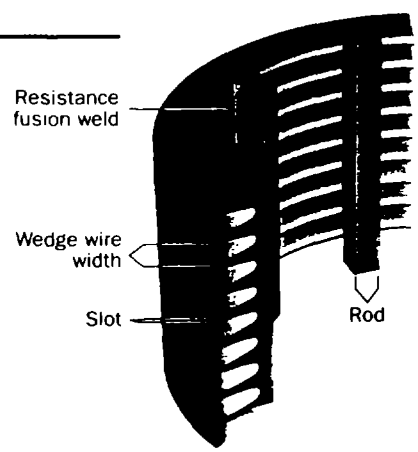
ook screens are precision, wire wound, rod based metallic strainer pipes that allow aximum flows from water bearing sand gravel deposits into the wall casings.



Wire wound screens are superior to slotted casings. They provide a much higher percentage of open area on the surface of the screen, thus increasing well yield and ecreasing the amount of time needed to develop the well. Our water well screens rovide less draw down, longer life and higher open area than slotted casings. Less draw down means lower pumping cost; longer life means fewer replacements; nd less sand means longer pump life.

he extra open area available in a Cook screen allows for a much more efficient well which in turn increases the effective diameter of the screened area.

Cook screens are welded into massive, unitized pipelike weldments by resistance welding cold drawn wire to inter-rods. Over 5,000 welds per foot are required to abricate a 7" outside diameter screen.



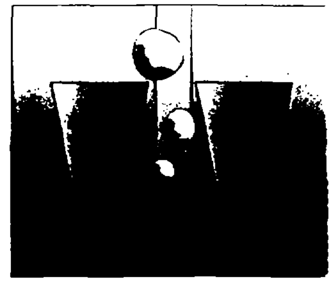
recise spacing of the wedge wire wrap provides precision slot apertures. They blend optimum open area with accepted resistance to prevent collapse. Many different wrap ires are available.

nd fittings are welded to screen and rod ends. These fittings can be of any design but are most often NPT pipe threads. Vertical rods have a large cross section to ensure reater loads of tension and compression.

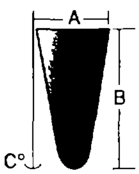
Cook Screen's continuous slot screens present only two point contact for retained particles, thereby permitting fine sand, silt or clay to be removed easily without plugging the screen apertures. Round holes or square mesh openings clog easily with near-size particles, resulting in blinding.

Because of the particle-free water allowed by our wedge wire continuous slot screen, pump wear and tear is reduced due to the absence of abrasive particles.

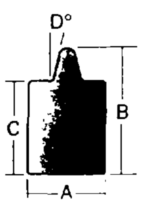
Our wedge wire continuous slot screen has a very low pressure drop and exceptionally good development characteristics. Compared to traditional screens, Cook screens can provide a smaller and less costly well bore.



Our continuous slot screens have only two point contact for retained particles.



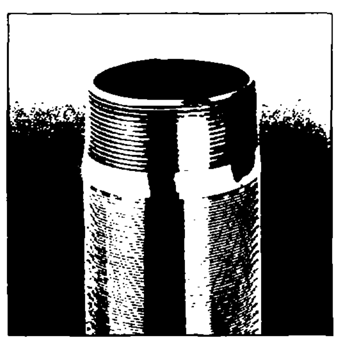
Shown actual size																
Wire No.	**158A**	**158**	**150A**	**150**	**130A**	**130**	**128SW**	**120A**	**120**	**93**	**90A**	**80S**	**69**	**60Z**	**60V**	**45**
Width in. (A)	.158	.158	.150	.150	.130	.130	.130	.120	.120	.090	.090	.080	.069	.060	.060	.045
Height in. (B)	.260	.230	.300	.215	.310	.250	.092	.180	.165	.140	.192	.112	.172	.070	.100	.097
Relief Angle (C)	15°	15°	11°	12.5°	8°	12.5°	42°	12°	12°	12°	6.75°	13°	6.25°	19.5°	13°	10°



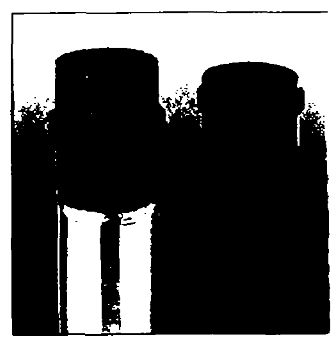
Shown actual size									
Rod No.	**L90Q**	**90Q**	**120H**	**130Q**	**162R**	**177R**	**217R**	**250R**	**290R**
Width in. (A)	.090	.090	.120	.130	.162	.177	.217	.250	.290
Height in. (B)	.125	.160	.165	.210	.162	.177	.217	.250	.290
Height in. (C)	.090	.110	.091	.160	NA	NA	NA	NA	NA
Relief Angle (D)	17.1°	12°	34°	14°	NA	NA	NA	NA	NA

Screen Size	OD Outside Diameter (in)	ID Inside Diameter (in)	Estimated Ship Weight for .010 Slot
2PS/3TE	2.66	2.27	4 lb./ft.
3PS/4TE	3.62	3.29	4 lb./ft.
4PS/5TE	4.65	4.32	5 lb./ft.
5PS/6TE	5.63	5.22	8 lb./ft.
6PS	6.63	6.16	9 lb./ft.
8TE	7.44	6.97	11 lb./ft.
8PS	8.68	8.14	17 lb./ft.
10TE	9.53	8.89	22 lb./ft.
10PS	10.8	10.21	25 lb./ft.
12TE	11.29	10.58	32 lb./ft.
12P/14T	12.66	11.99	36 lb./ft.
14P/16T	14.09	13.42	42 lb./ft.
16P/18T	16.01	15.21	52 lb./ft.

Complete specifications are available with price list on request.



Typical Pipesize Screen



Typical Telescope Screen

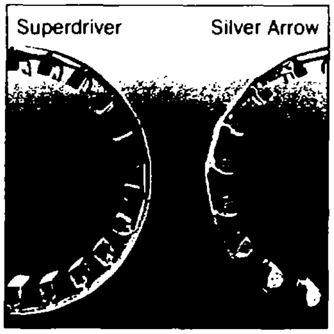
he Silver Arrow well point is a robust screen specifically ˬesigned for driven well applications.

The Superdriver has extra internal support rods that boost ıe screen's column strength. This allows it to better ʻithstand the shock of hard driving without collapsing.

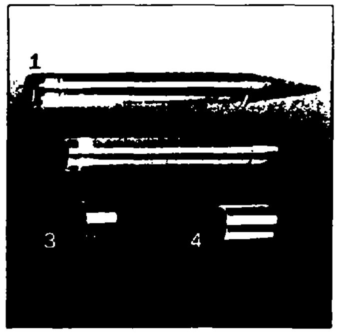
The Silver Arrow is all stainless steel from threaded end through the point and is available in 1¼" and 2" pipe size with NPT fittings. The Silver Arrow can be made in any slot size from 0.006" up to 0.100" and has effective screen length from two foot minimum, up to ten foot maximum.

Cook well points are also available in galvanized material.

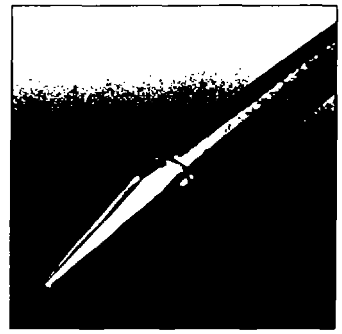
ainless steel construction from p fitting through bottom point. (Superdriver shown)



Side by side comparison illustrates structural differences between Superdriver and Silver Arrow well points.



Driven well components: (1) well point, (2) well point extension, (3) drive cap and (4) drive coupling.

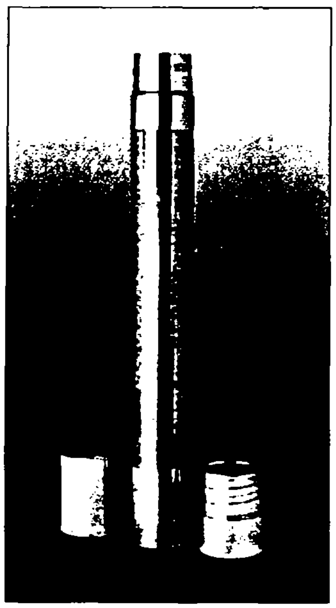


Stainless steel point features: flush to screen body design, double weld attachment to screen and internal drive plates available.

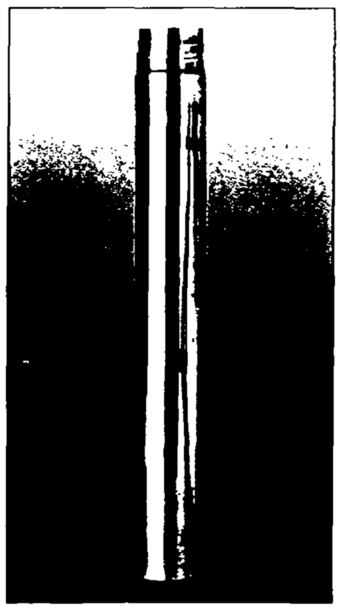
ook's Monitoring Screens *are innovatively engineered* *ʼ*ɿ reduce your cost.

ıe Sidewinder II has the strength required for installations as deep as 00'. Its high open area lows low entrance velocity, essential for taking ʻʻnaltered samples. The idewinder II is all stainless ɹ.eel, type 304 or 316. It has close-tolerance slots any size desired.

ɔr the times when PVC is inadequate and ɾonventionally built :ainless steel screens are ɹverdesigned, specify Cook Sidewinder II. It is available up to 8" diameter in any ot opening size.



Sidewinder II has been redesigned for higher open area.



Riser body is available in schedules 5, 10 or 40. Threads are ASTM F-480a (flush joint) made from schedule 40 material.

Environmental accessories: (1) slip-on centralizer, (2) female cap and (3) male plug with ASTM F-480a thread type.

As a division of PRAM Filtration, Cook Screen now offers an even broader range of experience, capabilities and technologically advanced manufacturing processes.

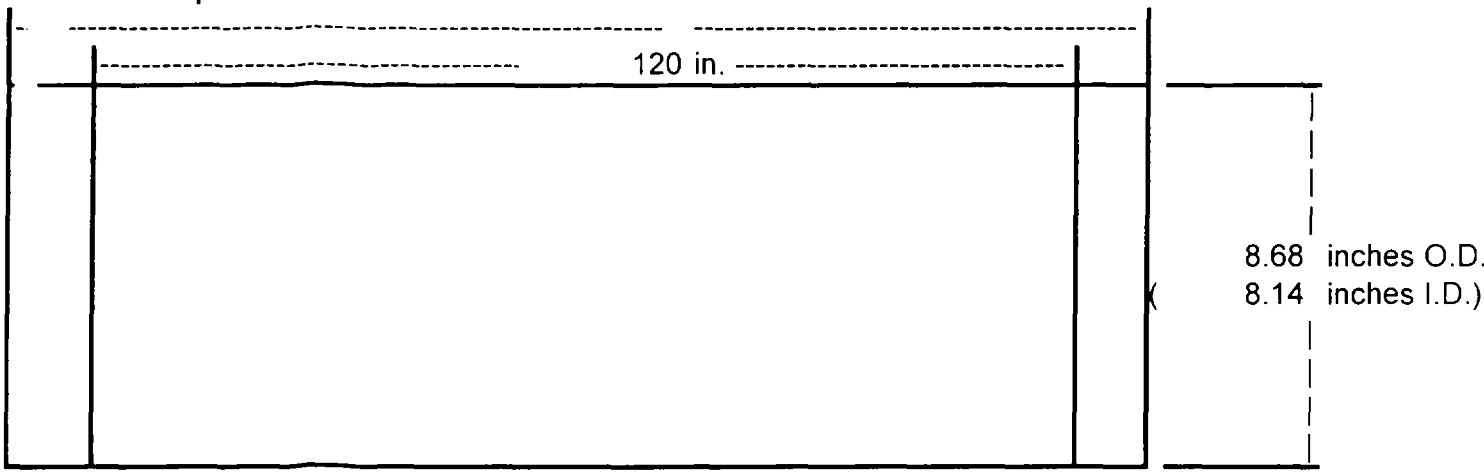
COOK SCREEN

PRAM FILTRATION CORP

T. 612-617-4470 F. 612-379-3149
E-mail. sales@pramfiltration.com
Web. www.pramfiltration.com

CUSTOMER	CONTRACT DEWATERING
PROJECT	8PSM SCREEN/7 WELL PROJECT

Description:



SCREEN SIZE	8PSM		
MATERIAL	304		
TOP FITTING	Weld Ring		
BOTTOM FITTING	Weld Ring End plate		
WIRE SHAPE No.	93V		
ROD SHAPE No.	90Q		
SLOT SIZE		0.01	inches
OPEN AREA		32.72	sq.in./linear ft.
PERCENT OPEN AREA		10.00%	
CAPACITY		10.14	GPM/ft. @ 0.1 fps
COLLAPSE RESISTANCE		134	psi
TOTAL ROD CROSS SECTIONAL AREA		0.4147	sq.in.
NUMBER OF RODS		36	
TENSILE LOAD @ 20,000 YIELD		8,294	pounds

SPECIAL OR OTHER INFORMATION:

DATE **20-Nov-00**

SALES PERSON________

COOK SCREEN TECHNOLOGIES, INC.

460 Hoover Street Northeast

Minneapolis, MN 55413

612/617-4470 * 612/379-3149 (fax)

MANUFACTURER'S PRODUCT SPECIFICATIONS

Conveyance Piping and Fittings (HDPE)

PE 3408 Industrial Piping System
Pipe Data and Pressure Ratings

Bulletin No. 301

Chevron PLEXCO

Pipe weights are calculated in accordance with PPI TR-7)
Average inside diameter calculated on minimum wall plus 6%.

Pressure Ratings are for water at 73°F. For other *fluids and service* temperatures ratings may differ, refer to Application Note No. 6 Chemical and Environmental Considerations.

Pressure Rating		100 psi DR 17.0			80 psi DR 21.0			65 psi DR 26.0			50 psi DR 32.5			40 psi DR 41.0			
IPS* Pipe Size	Nominal OD (in.)	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	IPS* Pipe Size
1¼"																	1¼"
1½"																	1½"
2"	2.375	0.140	2.078	0.43													2"
3"	3.500	0.206	3.063	0.93													3"
4"	4.500	0.265	3.938	1.54	0.214	4.046	1.26										4"
5⅜"	5.375	0.316	4.705	2.20	0.256	4.832	1.80	0.207	4.936	1.47							5⅜"
5"	5.563	0.327	4.870	2.35	0.265	5.001	1.93	0.214	5.109	1.58							5"
6"	6.625	0.390	5.798	3.34	0.315	5.957	2.73	0.255	6.084	2.23	0.204	6.193	1.80				6"
7⅛"	7.125	0.419	6.237	3.86	0.339	6.408	3.16	0.274	6.544	2.58	0.219	6.661	2.08				7⅛"
8"	8.625	0.507	7.550	5.65	0.411	7.754	4.64	0.332	7.921	3.79	0.265	8.063	3.05				8"
10"	10.750	0.632	9.410	8.78	0.512	9.665	7.21	0.413	9.874	5.87	0.331	10.048	4.75				10"
12"	12.750	0.750	11.160	12.36	0.607	11.463	10.13	0.490	11.711	8.26	0.392	11.919	6.67				12"
13⅜"	13.375	0.787	11.707	13.60	0.637	12.025	11.15	0.514	12.285	9.09	0.412	12.502	7.35				13⅜"
14"	14.000	0.824	12.253	14.91	0.667	12.586	12.22	0.538	12.859	9.96	0.431	13.086	8.05				14"
16"	16.000	0.941	14.005	19.46	0.762	14.385	15.97	0.615	14.696	13.02	0.492	14.957	10.51				16"
18"	18.000	1.059	15.755	24.65	0.857	16.183	20.19	0.692	16.533	16.48	0.554	16.826	13.29				18"
20"	20.000	1.176	17.507	30.42	0.952	17.982	24.92	0.769	18.370	20.34	0.615	18.696	16.41				20"
22"	22.000	1.294	19.257	36.81	1.048	19.778	30.19	0.846	20.206	24.62	0.677	20.565	19.87				22"
24"	24.000	1.412	21.007	43.82	1.143	21.577	35.92	0.923	22.043	29.29	0.738	22.435	23.62				24"
†26"	26.000	1.529	22.759	51.40	1.238	23.375	42.13	1.000	23.880	34.39	0.800	24.304	27.74				†26"
†28"	28.000	1.647	24.508	59.62	1.333	25.174	48.86	1.077	25.717	39.89	0.862	26.173	32.20				†28"
†30"	30.000	1.765	26.258	68.45	1.429	26.971	56.13	1.154	27.554	45.78	0.923	28.043	36.92	0.732	28.448	29.50	†30"
†32"	32.000	1.882	28.010	77.86	1.524	28.769	63.83	1.231	29.390	52.10	0.985	29.912	42.04	0.780	30.346	33.53	†32"
†34"	34.000	2.000	29.760	87.91	1.619	30.568	72.06	1.308	31.227	58.79	1.046	31.782	47.44	0.829	32.243	37.87	†34"
†36"	36.000	2.118	31.510	98.56	1.714	32.366	80.79	1.385	33.064	65.93	1.108	33.651	53.18	0.878	34.139	42.47	†36"
†42"	42.000				2.000	37.760	109.97	1.615	38.576	89.71	1.292	39.261	72.40	1.024	39.829	57.74	†42"
†48"	48.000				2.286	43.154	143.64	1.846	44.086	117.20	1.477	44.869	94.58	1.171	45.517	75.48	†48"
†54"	54.000				2.571	48.549	181.74	2.077	49.597	148.35	1.662	50.477	119.72	1.317	51.208	95.52	†54"

* Industrial PE (polyethylene) pipe sizes are identified by IPS (iron pipe size) diameters which designate the nominal diameter for 12" IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14" IPS and larger pipe.

PLEXCO can produce to specialized pipe dimensions. Check with your PLEXCO sales office for availability of dimensions not listed.

† SUBJECT TO MINIMUM ORDER QUANTITIES, AND AVAILABILITY OF TOOLING.

Rev. 3/93

PE 3408 Industrial Piping System
Pipe Data and Pressure Ratings

Bulletin No. 301

Plexco

Pipe weights are calculated in accordance with PPI TR-7)
Average inside diameter calculated on minimum wall plus 6%.

Pressure Ratings are for water at 73°F. For other fluids and service temperatures ratings may differ, refer to Application Note No. 6 Chemical and Environmental Considerations.

Pressure Rating		255 psi DR 7.3			200 psi DR 9.0			160 psi DR 11.0			130 psi DR 13.5			110 psi DR 15.5			
IPS* Pipe Size	Nominal OD (in.)	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	IPS* Pipe Size
1¼"	1.660	0.227	1.179	0.44	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26	0.107	1.433	0.23	1¼"
1½"	1.900	0.260	1.349	0.58	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34	0.123	1.639	0.30	1½"
2"	2.375	0.325	1.686	0.91	0.264	1.815	0.76	0.216	1.917	0.64	0.176	2.002	0.53	0.153	2.051	0.47	2"
3"	3.500	0.479	2.485	1.98	0.389	2.675	1.65	0.318	2.826	1.39	0.259	2.951	1.15	0.226	3.021	1.02	3"
4"	4.500	0.616	3.194	3.27	0.500	3.440	2.74	0.409	3.633	2.30	0.333	3.794	1.90	0.290	3.885	1.67	4"
5⅜"	5.375	0.736	3.815	4.66	0.597	4.109	3.90	0.489	4.338	3.27	0.398	4.531	2.72	0.347	4.639	2.40	5⅜"
5"	5.563	0.762	3.948	5.00	0.618	4.253	4.18	0.506	4.490	3.50	0.412	4.690	2.91	0.359	4.802	2.57	5"
6"	6.625	0.908	4.700	7.09	0.736	5.065	5.93	0.602	5.349	4.97	0.491	5.584	4.13	0.427	5.720	3.64	6"
7⅛"	7.125	0.976	5.056	8.20	0.792	5.448	6.87	0.648	5.751	5.75	0.528	6.006	4.78	0.460	6.150	4.21	7⅛"
8"	8.625	1.182	6.119	12.01	0.958	6.594	10.05	0.784	6.963	8.42	0.639	7.270	7.00	0.556	7.446	6.16	8"
10"	10.750	1.473	7.627	18.66	1.194	8.219	15.62	0.977	8.679	13.09	0.796	9.062	10.87	0.694	9.279	9.59	10"
12"	12.750	1.747	9.046	26.25	1.417	9.746	21.97	1.159	10.293	18.42	0.944	10.749	15.30	0.823	11.005	13.47	12"
13⅜"	13.375	1.832	9.491	28.88	1.486	10.225	24.17	1.216	10.797	20.26	0.991	11.274	16.83	0.863	11.545	14.83	13⅜"
14"	14.000	1.918	9.934	31.64	1.556	10.701	26.49	1.273	11.301	22.20	1.037	11.802	18.44	0.903	12.086	16.24	14"
16"	16.000	2.192	11.353	41.34	1.778	12.231	34.61	1.455	12.915	29.00	1.185	13.488	24.09	1.032	13.812	21.21	16"
18"	18.000	2.466	12.772	52.31	2.000	13.760	43.79	1.636	14.532	36.69	1.333	15.174	30.48	1.161	15.539	26.85	18"
20"	20.000	2.740	14.191	64.57	2.222	15.289	54.05	1.818	16.146	45.30	1.481	16.860	37.64	1.290	17.265	33.13	20"
22"	22.000	3.014	15.610	78.15	2.444	16.819	65.41	2.000	17.760	54.82	1.630	18.544	45.56	1.419	18.992	40.09	22"
24"	24.000	3.288	17.029	92.99	2.667	18.346	77.85	2.182	19.374	65.24	1.778	20.231	54.22	1.548	20.718	47.72	24"
†26"	26.000	3.562	18.449	109.15	2.889	19.875	91.35	2.364	20.988	76.58	1.926	21.917	63.63	1.677	22.445	56.02	†26"
†28"	28.000				3.111	21.405	105.96	2.545	22.605	88.79	2.074	23.603	73.76	1.806	24.171	64.94	†28"
†30"	30.000				3.333	22.934	121.62	2.727	24.219	101.94	2.222	25.289	84.68	1.935	25.898	74.56	†30"
†32"	32.000							2.909	25.833	115.99	2.370	26.976	96.35	2.065	27.622	84.88	†32"
†34"	34.000							3.091	27.447	130.92	2.519	28.660	108.80	2.194	29.349	95.83	†34"
†36"	36.000													2.323	31.075	107.40	†36"
†42"	42.000																†42"
†48"	48.000																†48"
†54"	54.000																†54"

Industrial PE (polyethylene) pipe sizes are identified by IPS (iron pipe size) diameters which designate the nominal diameter for 12" IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14" IPS and larger pipe.

PLEXCO can produce to specialized pipe dimensions. Check with your PLEXCO sales office for availability of dimensions not listed.

† SUBJECT TO MINIMUM ORDER QUANTITIES, AND AVAILABILITY OF TOOLING.

Rev. 1/90

Chevron

PLEXCO®
Performance Pipe Division - Chevron Chemical Company LLC
1050 IL Route 83, Suite 200 • Bensenville, IL 60106
Phone: 630-350-3758   Fax: 630-350-2704

February 19, 1999

Forrer Supply Co., Inc.
W194 N11811 McCormick Drive
P.O. Box 220
Germantown, WI 53022-0220
(262) 255-3030 Fax (262) 255-4064

This letter has been prepared at your request, concerning PLEXCO HDPE pipe and fittings.

PLEXCO pipe and fittings are manufactured from PPI listed PE3408 HDPE resins. These resins have a minimum cell classification of PE345444C when classified in accordance with ASTM D3350. These resins are extra high molecular weight, high density polyethylene resins which meet the requirements of Type III, Class C, Category 5, Grade P34 pipe grade materials in accordance with ASTM D1248-84. (ASTM D1248 no longer pertains to pipe grade resins and its reference in future specifications should be removed. It has been included here for historical perspective only.) PLEXCO has a Plastic Pipe Institute (PPI) recommended hydrostatic basis of 1600 psi at 23° C based on TR3 as derived from ASTM D2837 test methods.

The dimensional characteristics and pressure capabilities of PLEXCO are established in accordance with ASTM F714-94 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter. This standard is marked in the print line on each pipe.

Sincerely,

Lee Mizell
Municipal Products Manager

LM:dmd

Forrer Supply Co., Inc.
W194 N11811 McCormick Drive
P.O. Box 220
Germantown, WI 53022-0220
(262) 255-3030 Fax (262) 255-4064

Table 4-1 ASTM D 3350 Properties and Cell Classification Limits

Property	*Test Method*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Density, gm/cm^3	D 1505	Unspecified	0.910 - 0.925	0.926 - 0.940	0.941 - 0.955	>0.955	—	—	Specify Value
Melt Index, gm/10 min.	D 1238	Unspecified	>1.0	1.0 - 0.4	<0.4 - 0.15	<0.15	(a)	(b)	Specify Value
Flexural Modulus, MPa (1000 psi)	D 790	Unspecified	< 138 (<20)	138 - <276 (20 - <40)	276 - <552 (40 - <80)	552 - <758 (80 - <110)	758 - <1103 (110 - <160)	>1103 (>160)	Specify Value
Tensile Strength, MPa (1000 psi)	D 638	Unspecified	<15 (<2.2)	15 - <18 (2.2 - <2.6)	18 - <21 (2.6 - <3.0)	21 - <24 (3.0 - <3.5)	24 - <28 (3.5 - <4.0)	>28 (>4.0)	Specify Value
Slow Crack Growth Resistance (c)									
1. ESCR a. Test Condition b. Test Duration c. Failure, max, %	D 1693	Unspecified	A 48 50	B 24 50	C 192 20	C 600 20	—	—	Specify Value
2. PENT (hours) Molded plaque, 80°C, 2.4 MPa, Notch depth Table 1 F 1473	F 1473	Unspecified	0.1	1	3	10	30	100	Specify Value
Hydrostatic Design Basis, MPa (psi)	D 2837	NPR (d)	5.52 (800)	6.89 (1000)	8.62 (1250)	11.03 (1600)			
		A	B	C	D	E			
Color & UV Stabilizer	D 3350	Natural	Color	Black with min. 2% carbon black	Natural with UV Stabilizer	Color with UV Stabilizer			

(a): Classify materials having a melt index less than 0.15 (Cell 4) as Cell 5 only if they have a flow rate not greater than 4.0g/10 min when tested in accordance with Test Method D 1238, Condition 190/21.6.

(b): Classify materials having a melt index less than 0.15 (Cell 4) as Cell 6 only if they have a flow rate not greater than 0.30 g/10 min when tested in accordance with Test Method D 1238, Condition 310/21.6.

(c): Slow Crack Growth Resistance is classified using either ESCR per D 1693 or PENT per F 1473, but not both. Where there are cell values for ESCR per D 1693 and for PENT per F 1473, equivalency of material performance between D 1693 and F 1473 is not implied.

(d): NPR = Not Pressure Rated

CENTRAL PLASTICS COMPANY
P.O. BOX 3129 SHAWNEE, OK USA 74802-3129

CENTRAL PLASTICS ELECTROFUSION FITTINGS

STANDARD SPECIFICATION
(MADE IN USA)

The Electrofusion fittings are manufactured in compliance with ASTM F-1055 standard for electrofusion type polyethylene fittings for outside diameter controlled polyethylene pipe and tubing.

Fittings are tested in compliance with ASTM D-2513; ASTM F-1055.
Fittings are available tested to AWWA C906 Standard.

Resin is a PE 3408 virgin material that complies with ASTM D-1248; ASTM D-3350. The resin has a NSF Standard 14 listing and a Plastic Pipe Institute (PPI) rating.

Electrofusion Fittings are pressure rated for maximum operating pressure of 165 PSI.

The fittings are manufactured with an integral identification resistor, that automaticly sets the fusion time on the Central Plastics Electrofusion Processor.

(Long Term Hydrostatic Pressure Test Results)

Part tested	Number Tested	Pipe	Pressure (PSI)	Total Hours
2" coupling	6	PE 3408	340	15,936
3" coupling	6	PE 3408	340	15,864
4" coupling	6	PE 3408	340	15,672
6" coupling	6	PE 3408	340	28,453>
8" coupling	6	PE 3408	340	31,736>

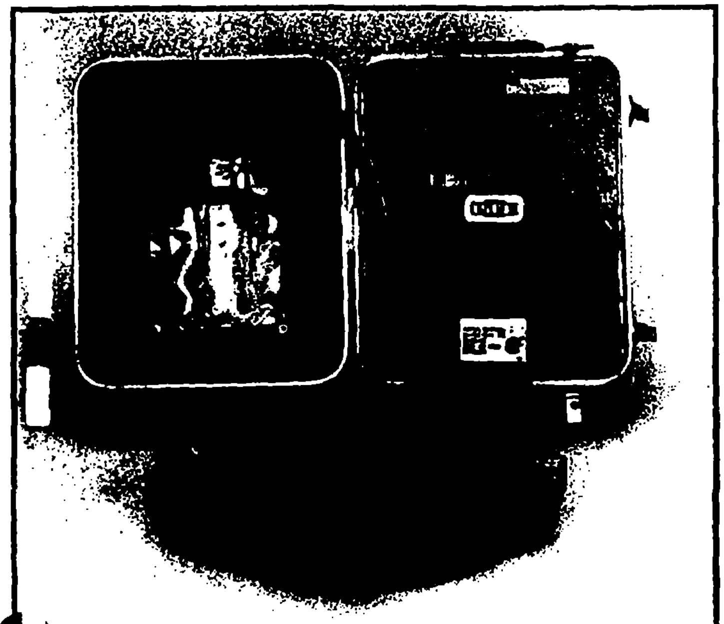
Looking for pipe repair and installation solutions?

Get out of the trenches and get connected.

CENTRAL

Universal Electrofusion Processor

Central's patented Universal Electrofusion Processor and molded fittings are unsurpassed in any field.



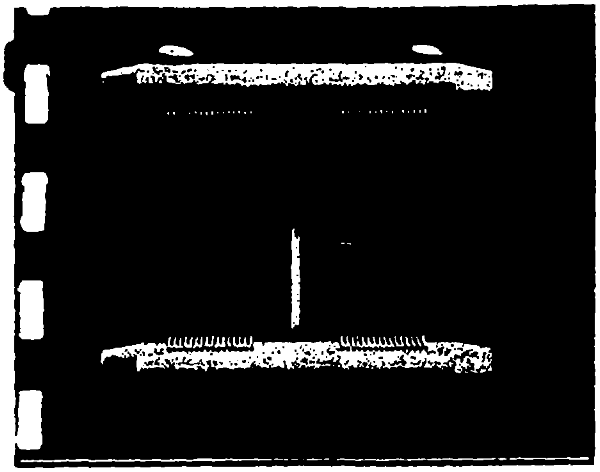
Central Plastics is the leading manufacturer of Electrofusion equipment, accessories and fittings made in the United States. Central's Universal Electrofusion System is backed by a 20-year history of research and development and thousands of fusion joints tested in all kinds of field and laboratory conditions.

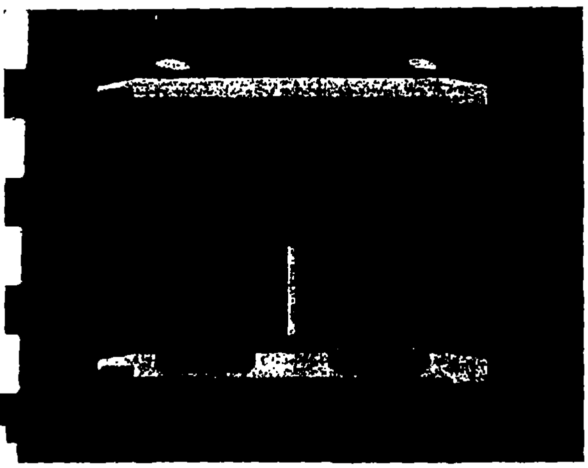
The Universal Electrofusion System is the only system that provides the security of an internal monitoring system at the heart of the critical area fusion zone. It also features total fitting compatibility, offering the versatility to work with any specialty fitting and resin available, no matter the manufacturer.

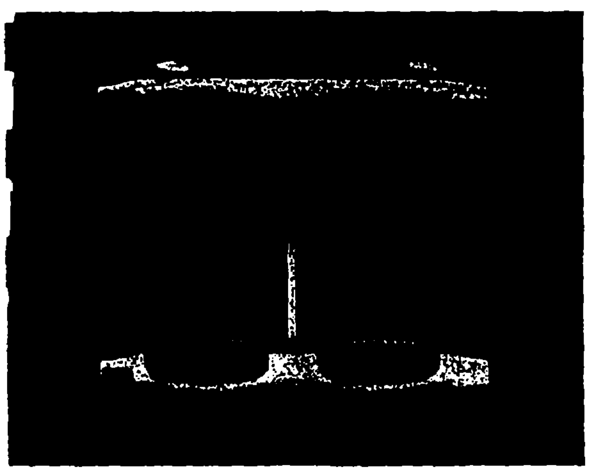
You can fuse other manufacturers' fittings with the Universal Processor. However, by doing this you lose Central's current monitoring capability.

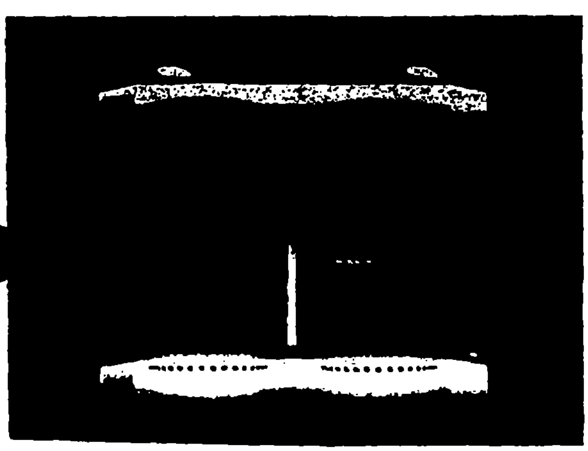
As the leader in the manufacture of Electrofusion fittings, Central Plastics meets all of the worldwide industry standards, including ISO 9001, and offers the widest range of fittings in standard sizes from 1/2" to 24" and larger, and also offers imperial sizes. If you are faced with a unique or difficult repair joint, tie-in, pipe burst or other trenchless problem, Central's engineering and technical staff is on call to help you find a solution.

Central's Universal Electrofusion System has proven to be a more consistent, cost-effective, secure and longer lasting alternative to any manually controlled fusion concept.









Electrofusion processors and fittings for the gas utility, oil field, power and water utilities, mining, landfill, plumbing, waste treatment and telecommunications industries.

- Current monitoring
- Self diagnostic
- Complete line of fittings and accessories
- Data retrieval
- Training and field support
- In-house repair and loaner programs

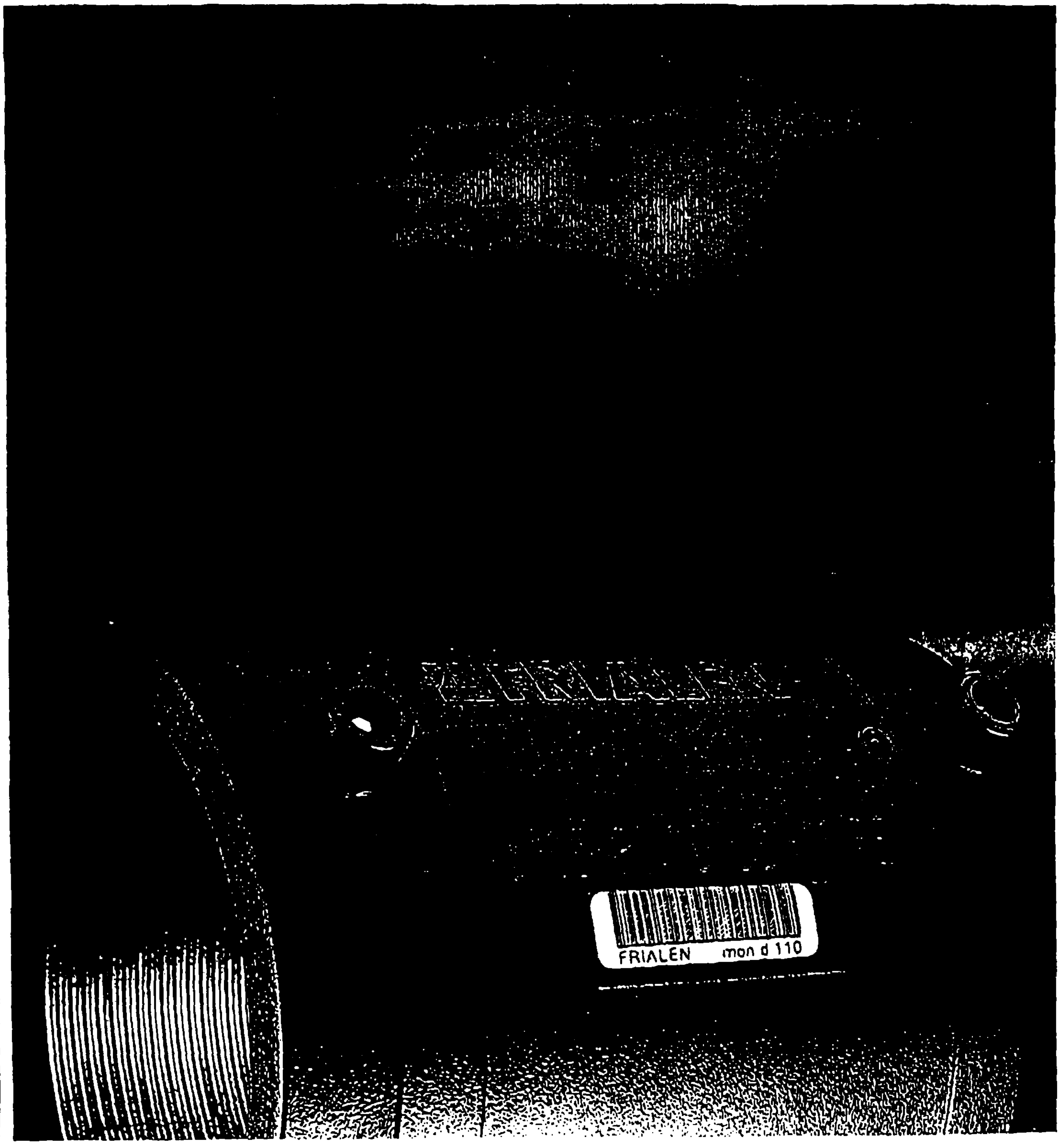
MADE IN THE U.S.A.

Used World-wide –
in unmistakable quality:

FRIALEN®
Safety Fittings

The safe jointing technique for gas, water and industrial HD-PE piping

FRIATEC

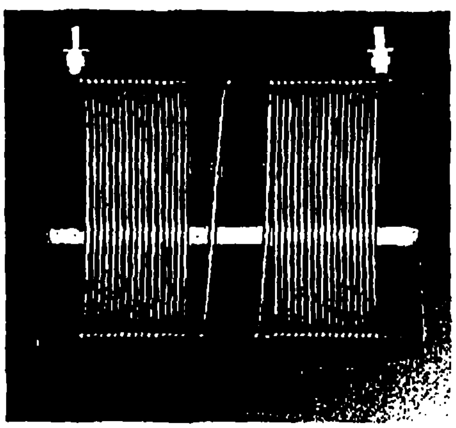


The international standard for Safety and Economy:
FRIALEN®-Safety Fittings

Based on practice and practical use.
The world leading position of FRIALEN® Safety electro-fusion Fittings, is founded on one clear precept:
Benefit to the user is the deciding factor.

The highest degree of safety is the first and most important feature. However economy counts just as much, as fast, simple and cost-effective use on the building site. These goals will only be achieved by a constant interchange between the world of practice and close collaboration with our customers.

Progress through co-operation and innovation.
This results again and again in modifications and extensions to the product range with practical and economical benefits for FRIALEN® users.



Some of the major benefits of the FRIALEN® Safety Fittings in brief:

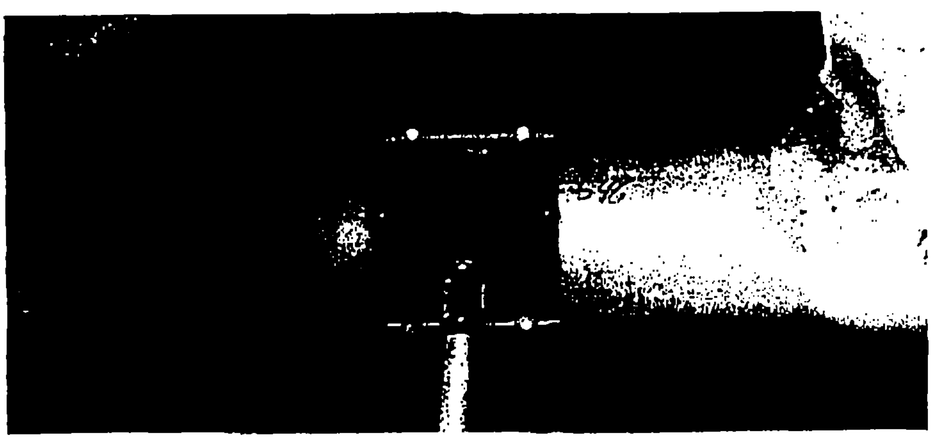
- Extra wide fusion zones, extra long insertion depths and large wall thicknesses.
- Can be used with all HD-PE pressure pipes.
- Installation in the tightest spaces possible.
- Pre-assembly of the pipe network to a great extent.
- Only a few tools required, no jigs to hold piping sections.
- No limitations imposed by the weather.
- Safe low voltage.
- Available as coupling with centre-
- Direct heat transfer to the pipe through exposed heat coil.
- Cold zones on the face and in the centre of the coupler.
- Small gap between pipe and fitting to build up an optimal joint pressure in the fusion zone.
- Contacts safe to touch.
- Fusion indicators for visual fusion indication.
- Permanent batch marking.

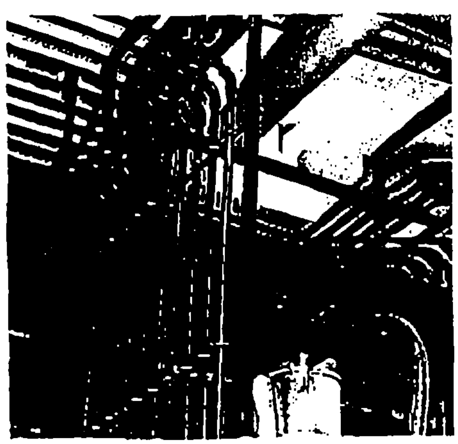
Gas, Water, Industry:

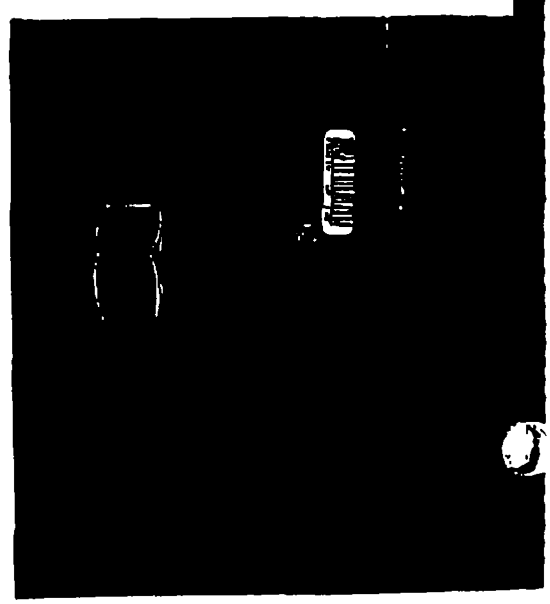
FRIALEN® – the safest connection with the future

Safe, proven, complete:
for every requirement in pipework construction
FRIALEN® Safety Fittings can be used for gas, water and industrial piping from d 20 to d 450. Gas pressures up to 4 bar, water pressures up to 10 bar. Tested to 16 bar (water). With a new generation of P 16 fittings suitable for use with water at 16 bar.

Full compatibility
The fittings can be fused without restriction to all HD-PE pipes in melt index groups 003 to 045 and – **of particular interest in the water-industry – to pipes made of PE 100.**



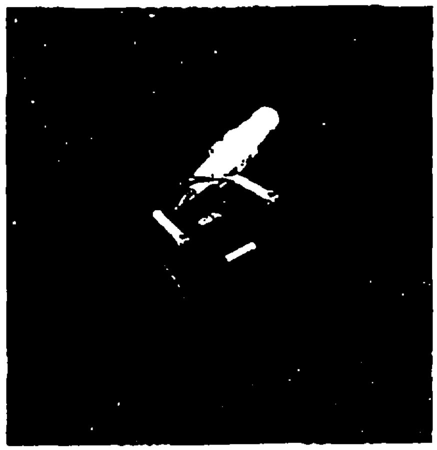


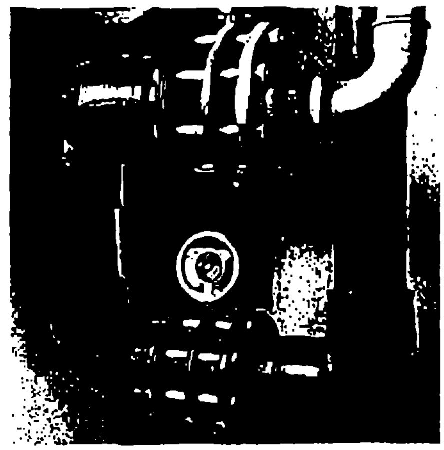


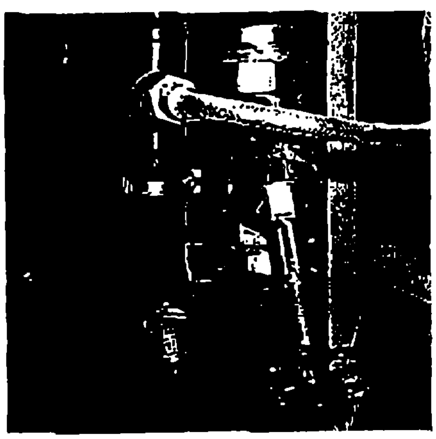
FRIATEC

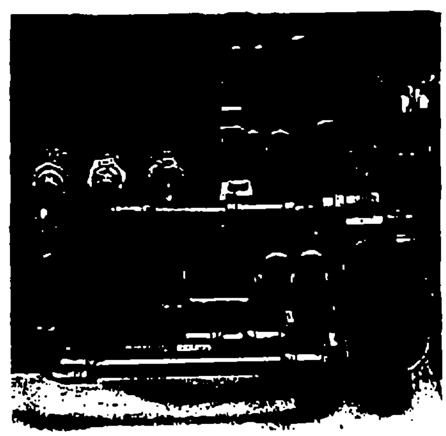
Applications in industry

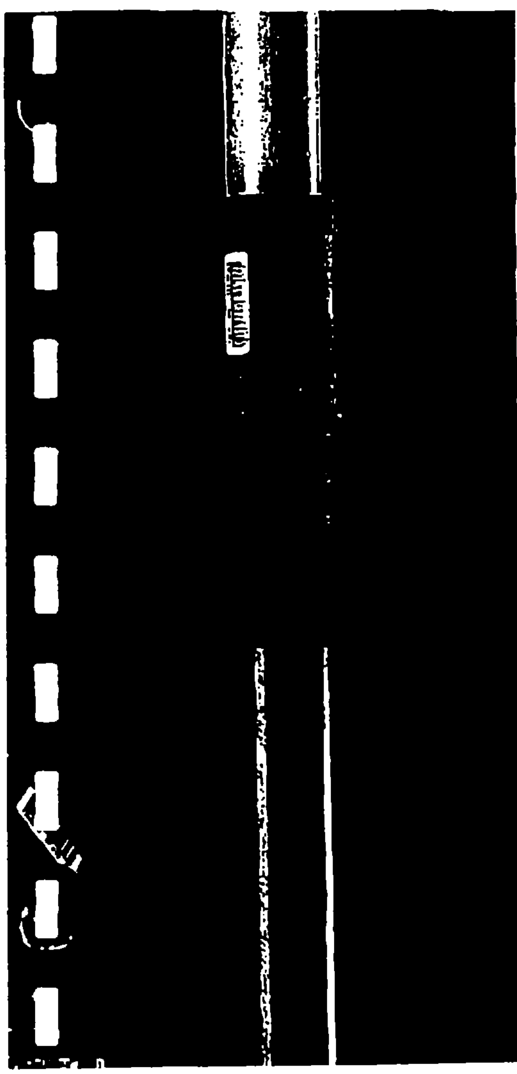
- Acid, alkalis and other types of chemical applications
- Transfer and flushing pipe systems
- Cooling pipes
- Media pipes, also for flammable and technical gases
- Compressed air, clean water, industrial water and effluent pipes












References World-wide

FRIALEN® Quality knows no boundaries

Building sites must not be kept waiting!
Availability is a part of the FRIALEN® quality strategy.
Excellent manufacturing capacity, modern logistics, quick reliable delivery – this all plays a large part alongside the quality of the product.

Thus in parallel with our international acceptance FRIALEN® has also developed an ever wider distribution network. Today we are present in many countries of the world – our customers don't have to go far to get their fittings, and that also includes technical application advice.

MANUFACTURER'S PRODUCT SPECIFICATIONS

Miscellaneous Valves and Fittings (Stainless Steel)

Southwest Stainless, Inc. 42

LABORATORY CORROSION DATA FOR STAINLESS STEELS

Media	Temp. †	Type 304	Type 316
ilc 'd			
1C	70	I	I
	B	I	I
50%	70	I	I
	B	II	I
1m%	70	I	I
	B	IV	I*
aetl apors			
3u%	H	III	II
...etic anhydride	70	I	I
	B	II	I*
...t chloride (Dry)	C	II	I
	B	II	II
Alco...	70	I	I
	H	I	I
Aluminum chloride	70	IV	III
Alu...um sulfate			
1%	70	II*	I*
	B	II	I
saturated	70	II*	I*
	B	III	II
Ar—onia			
all concentrations	70	I	I
	B	I	I
...nia chloride			
...0%	B	II*	I*
Ammonium nitrate			
saturated at 212 F	B	I	I
dissolved in conc. H_2SO_4	140	I	I
	250	II	II
Ammonium sulfate			
10% and saturated	B	II*	I*
...monium sulfite			
concentrated	70	I	I
	B	II	I
Barium chloride			
5% and saturated	70	II*	I*
Benzene	70	I	I
	B	I	I
Benzoic acid	70	I	I
Bichloride of mercury			
0.1%	70	I*	I*
	B	I*	I*
0.7%	70	II*	II*
	B	IV	IV
Borax			
5%	H	I	I
Boric acid			
concentrated	B	I	I
Butyric acid			
5%	70	I	I
	B	I	I
Calcium bisulfite			
At 300 psi	B	IV	I
	400	V	II
Calcium brine			
adulterated with			
sodium chloride	70	III*	I*
Calcium chlorate			
dilute	70	I	I
	H	I	I
Calcium chloride			
dilute solution	70	II**	I*
concentrated solution	70	II**	I*
saturated	212	III*	I*
Calcium hypochlorite			
5° Be	100	IV	III
2%	70	IV	II*

Media	Temp. †	Type 304	Type 316
Carbolic acid	B	I	I
Carbon tetrachloride			
pure (dry)	70	I	I
	B	I	I
aqueous solution 5-10%	70	III*	I*
Carnallite			
saturated	B	III*	I*
Chlorbenzol (conc.)			
pure (dry)	70	I	I
Chlorinated water			
saturated	70	III	II
Chlorine gas			
dry	70	I	I
moist	70	V	V
Chlorobenzene (dry)	B	I	I
Chloroform (dry)	70	I	I
Chrome alum			
Sp. gr. 1.8	B	II*	I*
Sp. gr. 1.6 + ferrous sulfate	212	II*	I*
Chromic acid			
C.P. 10% (free of SO_3)	70	I	I
	B	II	II
C.P. 50% (free of SO_3)	70	I	I
	B	III	III
Com. 50% (contains SO_3)	70	I	I
	B	V	V
chromelectrolyte (grube)	70	I	I
Citric Acid			
25% and 50%	70	I	I
	B	IV	I
5% at 45 psi	275	III	I
Copper sulfate			
saturated at 212 F	B	I	I
Cyanogen	70	I	I
Dichloro-ethane (dry)	B	I	I
Dinitrochlorbenzol			
melted and solidified	70	I	I
Ether	70	I	I
Ethyl acetate			
concentrated solution	70	I	I
Ethyl alcohol	70	I	I
Ethyl chloride (dry)	70	I	I
Ethylene chloride (dry)	70	I	I
Ethylene glycol			
concentrated	70	I	I
Ferric chloride			
1%	70	III*	I*
	B	IV	II*
5%	70	III	II*
Ferric hydroxide	70	I	
Ferric nitrate			
5% still or aerated	70	I	I
Ferrous chloride			
saturated solution	70	V	III
Ferrous sulfate			
10%	70	II*	I*
	B	II	I
Fluorine	70	V	V
Formaldehyde 40%	70	I*	I*
	B	I*	I*
Formic acid			
5% still	70	II	I
5% still	150	II	I
Furfural	70	I	I
Gallic acid			
saturated at 212 F	B	I	I
Glycerin (acid free)	70	I	I

Media	Temp. †	Type 304	Type 316
Hydrocyanic acid	70	I	I
diluted 1:85	70	III	II
	B	V	V
diluted 1:10	70	IV	II
	B	V	V
vapors	70	V	IV
	212	V	V
Hydrocyanic acid	70	I	I
Hydrofluoric acid			
vapors	70	IV	IV
	212	V	V
Hydrofluosilicic acid			
vapors—75% min. HF	70	V	V
	212	V	V
Hyposulfite soda			
dilute	H	I	I
Iodoform	125	I*	I
Lactic acid			
5%	70	I	I
	150	II	I
10%	B	IV	I
	150	III	
Lead, molten (pure)	1100	III	III
Lead acetate	B	I	I
Linseed oil	70	I	
	H	I	
+ 3% sulphuric acid	400	III	
Magnesium chloride			
1 and 5%	70	II*	I*
	H	III*	I*
Magnesium oxychloride	70	III	I
Manganese chloride			
10 and 50%	B	III*	II*
Mercuric bichloride			
0.7%	70	II	II
Mercuric chloride			
dilute solutions		V	IV
Mercury			
liquid	70 & 125	I	I
Methylene chloride (Dry)	B	I	
Mixed acids (% in weight)			
50% sulfuric acid			
+ 50% nitric acid	140	I	I
	200	II	II
	B(250)	III	III
75% sulfuric acid			
+ 25% nitric acid	140	I	I
	200	II	II
	B(315)	IV	IV
70% sulfuric acid			
+ 10% nitric acid			
+ 20% water	140	I	I
	200	II	II
	B(335)	V	V
30% sulfuric acid			
+ 15% nitric acid			
+ 65% water	140	I	I
	200	I	I
	B(230)	II	II
15% sulfuric acid			
+ 5% nitric acid			
+ 80% water	140	I	
	200	I	I
	B(220)	I	I

LEGEND: I—Fully resistant. II—Satisfactorily resistant. III—Fairly resistant. IV—Slightly resistant. V—Non resistant.

† — Testing temperatures in Fahrenheit. H—Hot B—Boiling C—Cold

Southwest Stainless, Inc.

Media	Temp. t	Type 304	Type 316
Mixtures of acids and salts			
Fuming nitric acid (Sp. gr. 1.52) + 10% potassium nitrate	B	II	II
Fuming nitric acid (Sp. gr. 1.52) + 10% aluminum nitrate	B	II	II
10% sulfuric acid + 10% copper sulfate	B	I	I
10% sulfuric acid + 2% ferrous sulfate	B	III	II
Naphthalene sulfonic acid (Dry)	70	I	I
Nickel chloride			
Solutions	70	III*	II*
Nickel sulfate			
solutions	70	II*	I*
Nitric acid			
diluted 1:1	70	I	I
	B	I	I
concentrated	70	I	I
	B	II	II
fuming	70	I	I
	B	IV	IV
[illegible] acid			
5% Solution	70	I	I
Oleic acid, Raw	300	II	I
	400	III	II
Oil crude			
asphalt base	H	I	I
paraffin base	70	I	I
Oil vegetable	H & C	I	I
Oxalic acid			
10%	70	I	I
	B	IV	II
25%	B	IV	II
50%	B	IV	II
Phosphoric acid			
1%	70	I	I
	B	II	I
1% at 45 psi	275	II	I
10%	B	IV	I
45%	B	IV	II
80%	140	III	II
	230	V	III
Phosphoric anhydride			
dry or moist	70	I	I
Photographic developers			
reducing hydroquinone, amidol, ferrous-potassium oxalate	70	I*	I*
	B	I*	I*
Picric acid		I	I
Potassium bitartrate			
saturated	B	II	I
Potassium bichromate			
25%	70	I	I
Potassium bromide	70	II*	I*
Potassium chlorate			
saturated	B	I	I
Potassium chloride			
1%	70	I*	I*
	B	I*	I*
5%	70	I*	I*
	B	II*	I*

Media	Temp. t	Type 304	Type 316
Potassium dichromate			
25%	B	I	I
Potassium ferricyanide			
25%	70	I	I
	B	I	I
Potassium ferrocyanide			
5%	70	I	I
Potassium hypochlorite			
Conc. solution	70	IV	III*
Potassium oxalate		I	I
Potassium sulfate			
1%	70	I	I
5%	70	II	I
	H	II	I
Potassium sulfide			
Solution	H	I	I
Pyrogallic acid		I	I
Salt brine			
3%	70	I*	I*
Over 3%	70	II*	I*
Sea water			
100g contains: 2.72g NaCl; 0.33 $MgCl_2$: 0.22g $MgSO_4$: 0.13g $CaSO_4$: 0.97g KCl: 0.008g $MgBr_2$ 0.012g $CaCO_3$	70	II*	I*
Silver nitrate			
10%	B	I	I
Soap	70	I	I
Sodium acetate—moist		I*	I
Sodium bisulfate			
10%	70	II	I
	B	II	I
Sodium bisulfite			
Sp. gr. 1.38—solution	70	I	I
Sodium carbonate			
50%	B	I	I
	Melting (1650)	V	V
Sodium chloride			
saturated, cold	70	I*	I*
	B	II*	I*
saturated at 212 F	H	II*	I*
Sodium fluoride			
5% solution		II*	I*
Sodium hydroxide			
20%	230	I	I
34%	212	I	I
	B	II	II
melting	610	II	II
Sodium hypochlorite 5%	70	III*	II*
Sodium hyposulfite			
dilute solution	H	I	I
Sodium perchlorate 10%	70	I	I
	B	I	I
Sodium sulfate			
all concentrations	H	II	I
Sodium sulfide			
50%	B	I	I
saturated	B	I*	I
Sodium sulfite 50%	B	II	I
Sodium thiosulfate			
saturated solution	70	I	I
acid fix (hypo)	70	I	I
25% Solution	70	I	I
	B	I	I*
20% - 20% acetic acid	70	I	I

Media	Temp. t	Type 304	Type 316
Stannic chloride			
solution (Sp. gr. 1.21)	70	IV	III
	B	V	V
Stannous chloride	125	III*	II*
Stearic acid	70	I	I
	350	IV	I
Sugar			
solution	H	I	I
Sulfur			
fused	265	I	I
boiling	830	V	V
Sulfur dioxide			
gas, moist	70	II	I
gas, dry	575	I	I
Sulfur monochloride	70	III	II
Sulfuric acid			
diluted 1:20	70	II	I
	B	V	IV
diluted 1:10	70	III	II
	B	V	V
diluted 1:1	70	III	II
	B	V	V
concentrated	70	I	I
	212	IV	IV
	300	V	V
fuming (11% free SO_3)	212	II	II
(60% free SO_3)	70	II	II
	160	II	II
Sulfurous acid in water			
saturated	70	II	I
At 60 psi	275	II	I
At 70-125 psi	320	V	II
At 150 psi	350	V	II
At 200 psi	400	V	II
At 300 psi	400	V	II
Tannic acid			
10%	B	I	I
50%	B	I	I
Tanning liquor		I	I
Tartaric acid			
10%	70	I	I
	B	I	I
50%	70	I	I
	B	II	I
Tin (molten)	1100	V	V
Trichloracetic acid	70	V	V
Trichlorethylene (dry)	70	I	I
Varnish	70	I	I
	H	I	I
Zinc (molten)	1100	V	V
Zinc chloride			
solution, Sp. gr. 2.05	100	III*	I*
solution, Sp. gr. 1.09	B	IV	I*
78° Be	95	III*	I*
Zinc sulfate			
25%	C	I	I
	B	II	I
saturated	70	I	I

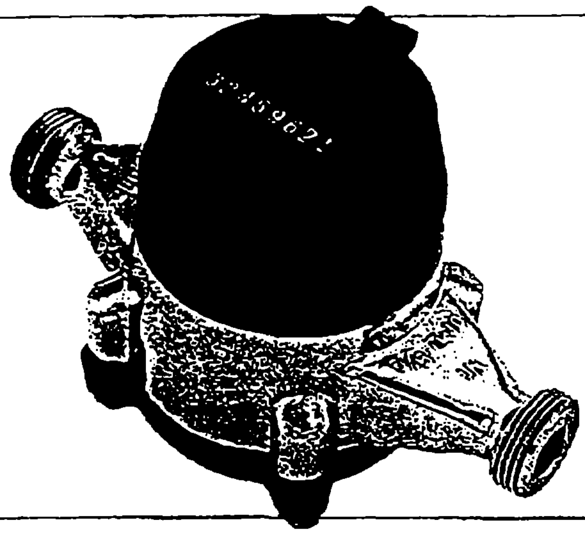
*—Pitting *may occur under certain conditions.* **—Solution should be kept alkaline. -Attack may occur when sulfuric acid is present.

MANUFACTURER'S PRODUCT SPECIFICATIONS

Flow Meters

Schlumberger Industries

Water Division



Neptune® T-10®

Water Meter
Sizes: 5/8", 3/4", & 1"

Features and Benefits

Roll-Sealed Register
- Magnetic drive, low torque registration ensures accuracy
- New impact resistant register design with flat glass for legibility
- 1:1 Ratio, low flow indicator detects leaks
- Bayonet mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

Cast Bronze Maincase
- Sturdy, durable corrosion resistant
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Residual value

Nutating Disc Measuring Chamber
- Positive displacement
- Widest effective flow range for greater utility revenue
- Extended low flow accuracy
- Corrosion resistant
- Floating chamber design is unaffected by meter position or in-line piping stress

Systems Compatibility
- Adaptability to all Neptune Systems provides flexibility

Performance

Every Neptune T-10 water meter meets or exceeds the latest AWWA Standard, C700-90. Its nutating disc, positive displacement principle is time proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

Construction

The Neptune T-10 water meter consists of three major assemblies: a roll-sealed register, a cast bronze maincase, and a nutating disc measuring chamber.

The roll-sealed register eliminates lens fogging, uses naturally lubricated, molded gears, and contains a low flow indicator for leak detection. For reading convenience, the register can be mounted in any one of four positions on the meter. All T-10 water meters can accommodate standard registers or remote reading registers for the Neptune ARB® (Automatic Reading and Billing) System, Pulser-RM visual remote system, and Tricon™/S and Tricon/E systems.

The corrosion-resistant cast bronze maincase will withstand most service conditions: internal water pressure, rough handling, and in-line piping stress. For frost protection, synthetic polymer or cast iron bottom caps are available.

The innovative floating chamber design of the nutating disc measuring element protects the chamber from frost damage while the unique chamber seal extends the low flow accuracy by bonding the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion resistant materials throughout and a thrust roller to minimize wear.

Warranty and Maintenance

Neptune T-10 water meters are warranted by Schlumberger for performance, materials, and workmanship. Schlumberger further offers an optional post-warranty factory "Revenue Asset Maintenance" (RAM) program for extended service life.

When desired, owner maintenance is easily accomplished either by unitized replacement of major components or by repair of an individual component's parts.

Guaranteed Systems Compatibility

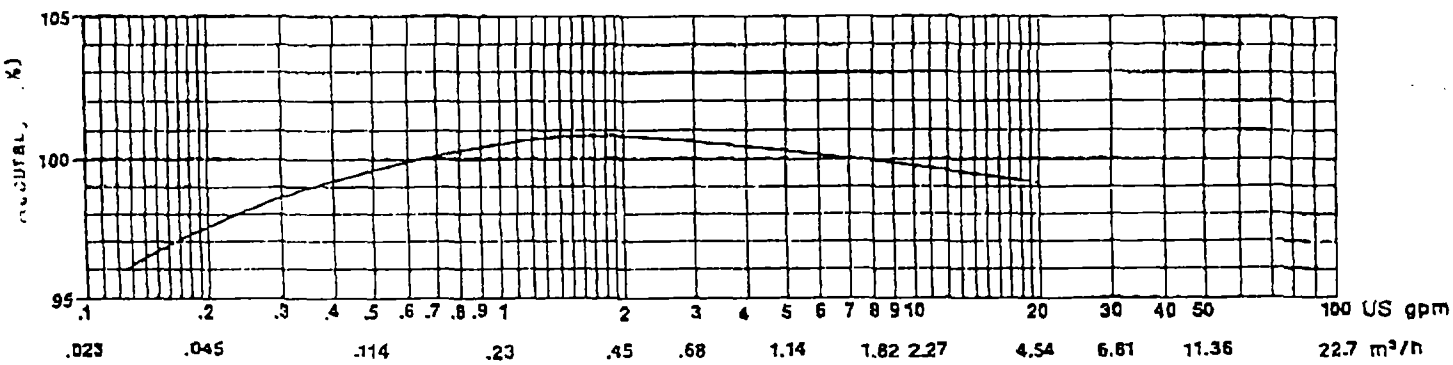
All Neptune T-10 meters are guaranteed adaptable to Pulser-RM, ARB®, ARB® ProRead™, CMR®, Tricon/S, Tricon/E, NMR, and Unigun™ Systems without removing the meter from service.

Schlumberger Industries

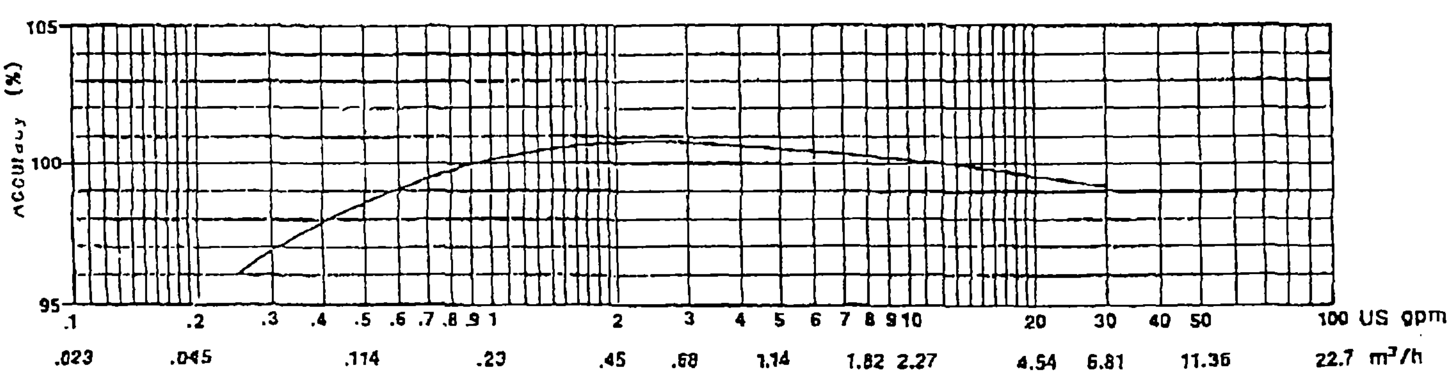
Water Division

5/8", 3/4" & 1"
NEPTUNE T-10 ACCURACY

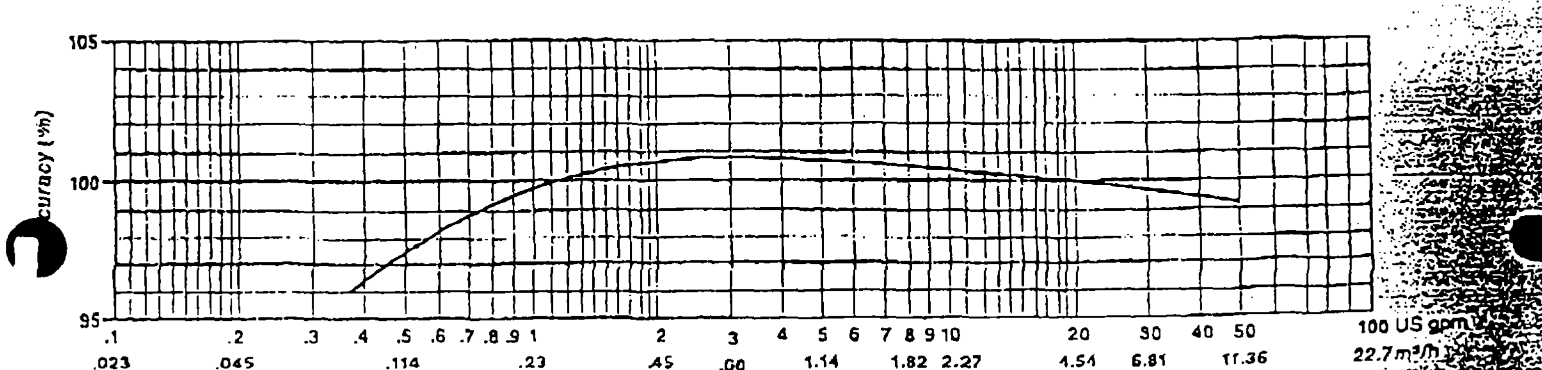
5/8"



3/4"



1"

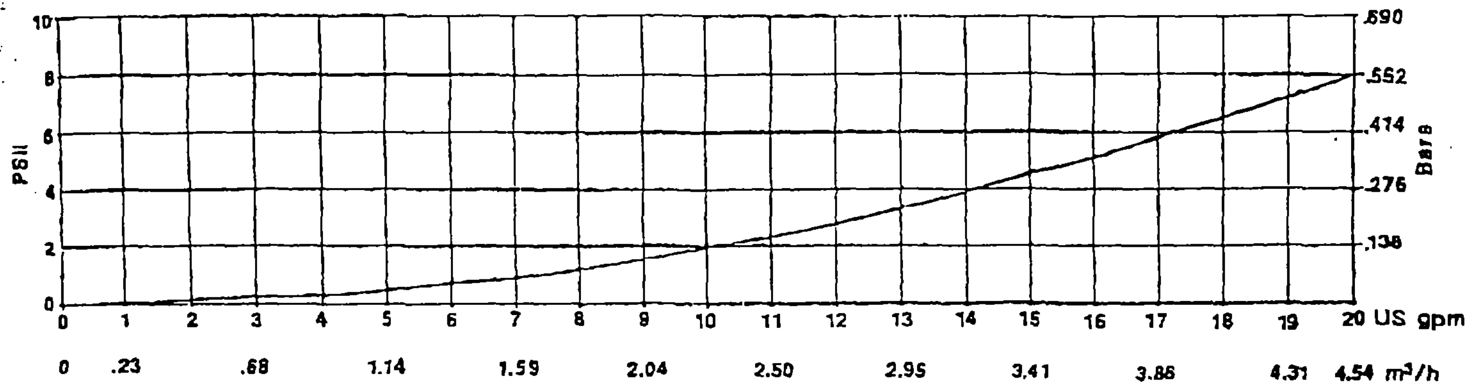


Schlumberger Industries

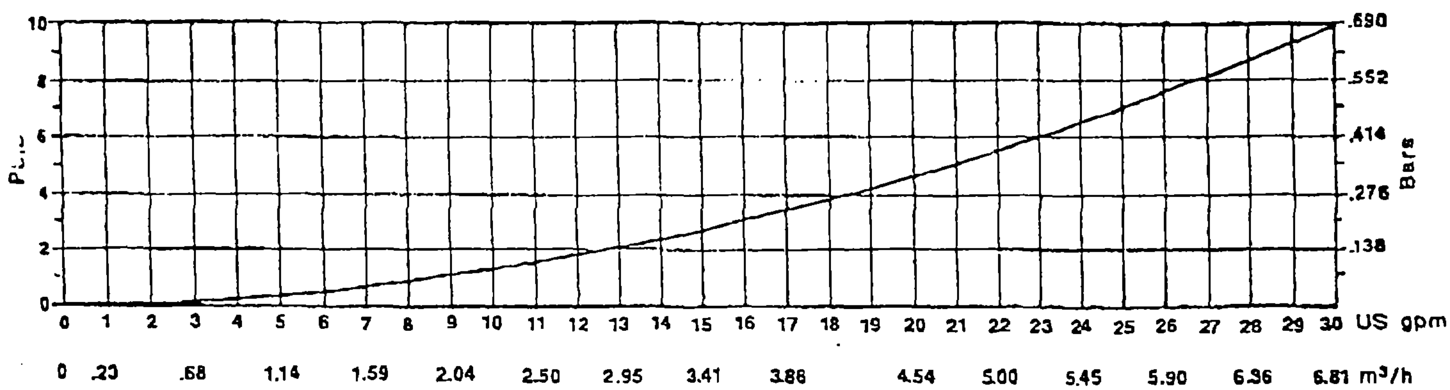
Water Division

5/8", 3/4" & 1" NEPTUNE T-10 PRESSURE LOSS

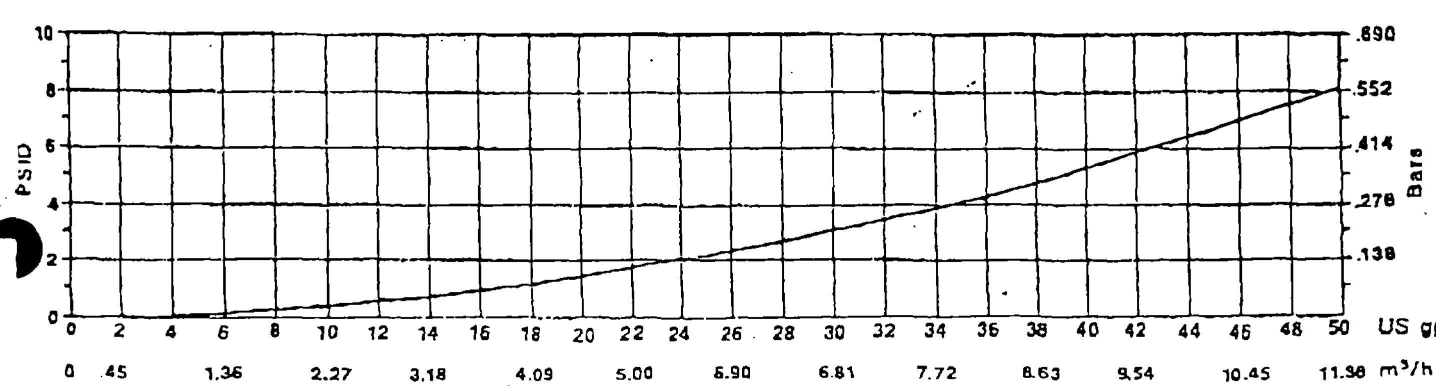
5/8"



3/4"



1"



Water Division

⌐pecifications

⌐ɔplication
ɩ ɔld water measurement of flow in one direction

˙ˑaximum Operating Pressure
˙ ɩ0 psi (1034 kPa)

Register
Γ˙ect reading, center sweep, roll-ꜝ aled, magnetic drive, with low flow indicator

˙ˑeasuring Chamber
ꜝ ɩtating Disc, synthetic polymer

Options

⌐.zes
⅝", ⅝" x ¾"
˙ ˙, ¾" SL, ¾" x 1"
, 1" x 1¼"

Units of Measure
˙˙ S. Gallons
ɩperial Gallons
ɩic Feet
Cubic Metres

ɜgister Types
Direct Reading:
- Synthetic polymer box and cover
- Bronze box and cover

ɩ.ɜmote Reading:
- ARB, ARB ProRead
- Pulser-RM
- Tricon/S
- Tricon/E

ɔttom Caps
ɟnthetic polymer (⅝" only)
Cast Iron
ɔnze

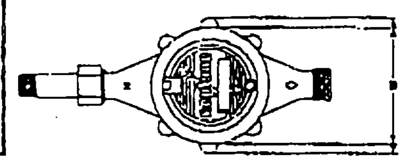
Connections
Bronze, straight or bent

Operating Characteristics

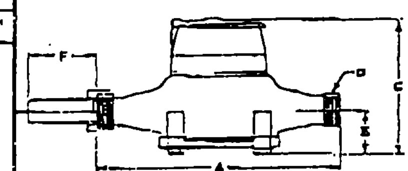
Meter Size	Normal Operating Range (@ 100% Accuracy ± 1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
⅝"	½ to 20 US gpm 0.11 to 4.5 m³/h	1 to 20 US gpm 0.23 to 4.5 m³/h	⅛ US gpm 0.03 m³/h
¾"	¾ to 30 US gpm 0.17 to 6.8 m³/h	2 to 30 US gpm 0.45 to 6.8 m³/h	¼ US gpm 0.06 m³/h
1"	1 to 50 US gpm 0.23 to 11.4 m³/h	3 to 50 US gpm 0.68 to 11.4 m³/h	⅜ US gpm 0.09 m³/h

Registration

Registration (per sweep hand revolution):		⅝"	¾" & 1"
10	US Gallons	✓	✓
10	Imperial Gallons	✓	✓
1	Cubic Feet	✓	✓
0.1	Cubic Metres	✓	✓
0.01	Cubic Metres	✓	



Register (6-wheel odometer):		⅝"	¾" & 1"
10,000,000	US Gallons	✓	✓
10,000,000	Imperial Gallons	✓	✓
1,000,000	Cubic Feet	✓	✓
100,000	Cubic Metres	✓	✓
10,000	Cubic Metres	✓	



Dimensions

Meter Size	A in/mm	B in/mm	C Std in/mm	C ARB in/mm	C Pul in/mm	D Threads per inch	D OD in/mm	E in/mm	F in/mm	Approx Weight lbs/kg
⅝"	7½ 191	3⅝ 92	4⅞ 124	5⅜ 137	6¾ 171	14	1.030 26	1⅝ 41	2½ 64	3¾ 1.7
⅝" x ¾"	7½ 191	3⅝ 92	4⅞ 124	5⅜ 137	6¾ 171	11½	1.290 33	1⅝ 41	2⅝ 67	4 1.8
¾"	9 229	4⅜ 111	5½ 140	5¹³⁄₁₆ 148	7⅜ 187	11½	1.290 33	1⅞ 48	2⅝ 67	6 2.7
¾" SL	7½ 191	4⅜ 111	5½ 140	5¹³⁄₁₆ 148	7⅜ 187	11½	1.290 33	1⅞ 48	2⅝ 67	5½ 2.5
¾" x 1"	9 229	4⅜ 111	5½ 140	5¹³⁄₁₆ 148	7⅜ 187	11½	1.626 41	1⅞ 48	2¾ 70	6½ 2.9
1"	10¾ 273	6½ 165	6⅜ 162	6⅝ 168	8³⁄₁₆ 208	11½	1.626 41	2⅛ 54	2¾ 70	9¾ 4.4
1" x 1¼"	10¾ 273	6½ 165	6⅜ 162	6⅝ 168	8³⁄₁₆ 208	11½	1.865 47	2⅛ 54	2¹³⁄₁₆ 71	10¼ 4.6

Schlumberger Industries

NEPTUNE T-10

5/8" through 2"

FEATURES	BENEFITS
Increased Low Flow Accuracy with Nutating Disc	Low Flow at 95%

	T-10	AWWA
5/8"	1/8 gpm*	1/4 gpm
3/4"	1/4 gpm*	1/2 gpm
1"	3/8 gpm*	3/4 gpm
1-1/2"	3/4 gpm	1-1/2 gpm
2"	1 gpm	2 gpm

*Guaranteed for five years.

Floating Chamber

- ✔ No effect from maincase distortion, less effect on accuracy if meter freezes.
- ✔ Assures continued chamber accuracy.
- ✔ 100% interchangeable among all T-10 meters of the same size.

O-Ring Gasket

- ✔ Seals chamber outlet port to maincase outlet port ensuring extended low flow accuracy.

Low Flow Indicator

- ✔ Leak detection for improved customer service.

Removable Control Block Assembly

- ✔ Increased longevity and easy maintenance.

Key Building Block in Meter Information Management Systems

- ✔ ARB Systems, TRICON, FloSearch, and CMR.

Tamperproof Seal Pin

- ✔ Prevents vandalism and tampering by eliminating seal screws.
- ✔ Allows in-service replacement of register.

Roll-Sealed Register

- ✔ Eliminates leaking and fogging.

Impact Resistant Register Design

- ✔ Minimizes lens breakage by utilizing a special lens gasket and retainer ring.

Intermediate Meters

- ✔ Repairable, one-piece disc.

Chamber Frost Protection

- ✔ Guarantees chamber operation.

Lifetime Maincase Warranty

- ✔ Maincase guaranteed for life of meter.

SPECIFICATIONS FOR COLD WATER METERS
5/8" through 1"

SCOPE

All meters furnished shall conform to the "Standard Specifications for Cold Water Meters" - C700, latest revision issued by AWWA. The following requirements for specific details are made referring to the section numbers contained in the AWWA specifications.

GENERAL

All meters shall consist of a bronze maincase with the serial number stamped on the maincase.

Only displacement meters of the flat nutating disc type will be accepted because of improved operation.

The size, capacity, accuracy and meter lengths shall be as specified in AWWA Standard C700, latest revision. The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision.

METER MAINCASE

Maincases shall be the removable bottom cap type with the bottom cap secured by four (4) bolts on 5/8" and 3/4" sizes and six (6) bolts on the 1" size. Bottom caps shall be interchangeable, size for size, between frost-protected synthetic polymer or cast iron and non-frost-protected (bronze) models. No meters utilizing frost plugs will be accepted.

Frost-protected meters shall have a cast iron or synthetic polymer bottom cap. Non-frost protected meters shall have bronze or synthetic polymer bottom caps. The cross section of the bottom shall break clean when subjected to freezing pressure of 600-850 psi.

All maincase bolts shall be of 300 series stainless steel to prevent corrosion. Bottom cap bolt lugs shall be enclosed in the maincase and shall not have externally exposed, threaded through holes.

REGISTER

The register shall be of the straight reading sealed magnetic drive type and shall contain six (6) numeral wheels. Registers must be roll sealed and dry. All direct reading register lenses shall be flat, of high strength, and impact resistant glass to prevent breakage. The register retaining shall be designed to absorb impact from the register.

The register shall have the size, model and date of manufacture stamped on the dial face. The dial shall be of the center sweep pointer type and shall contain 100 equally divided graduations at its periphery.

The register must contain a low flow indicator with a 1:1 disc nutating ratio to provide leak detection. Register boxes shall be synthetic polymer or bronze.

All meters must be adaptable to encoder type registers without interruption of the customer's service.

Registers shall be secured to the maincase by means of a plastic tamperproof seal to allow for in-line service replacement. Seal screws are not accepted.

MEASURING CHAMBER

The measuring chamber shall be of a 2-piece snap-joint type. The chamber shall be made of non-hydrolizing synthetic polymer, shall be smoothly and accurately machined and shall contain a removable molded diaphragm of the same material as that of the chamber. No screws shall be used to secure the chamber together.

The control block shall be the same material as the measuring chamber and be mounted on the chamber top to provide sand ring protection. The control block assembly shall be removable to facilitate repairing and allow for a greater disc socket wear surface for increase longevity. Control block assemblies shall be designed as not to allow any magnetic slippage which would result in a loss of revenue.

The measuring chamber outlet port shall be sealed to the maincase outlet port by means of an "O" ring gasket to eliminate any chamber leak paths.

The chamber is a nutating disc type, the flat nutating disc shall be one piece construction molded of a non-hydrolizing synthetic polymer and shall contain a type 316 stainless steel spindle. The nutating disc shall be equipped with a synthetic polymer thrust roller located within the disc slot. The roller head shall roll on the buttressed track provided by the diaphragm in the measuring chamber near the chambers outport.

STRAINERS

All meters shall contain removable polypropylene plastic strainer screens. The strainer shall be located near the inlet maincase port before the measuring chamber and control block assembly.

PERFORMANCE

Registers must be guaranteed for at least ten years. All meters will be guaranteed for one year on material and workmanship.

To ensure accuracy, each meter must be accompanied by a factory test tag certifying the accuracy at the flows required by AWWA C700 (low, intermediate, and full flow).

Meters and meter parts shall be manufactured in the Continental United States.

Manufacturers shall have a minimum of five years of production experience with all sizes of the model quoted for model standardization.

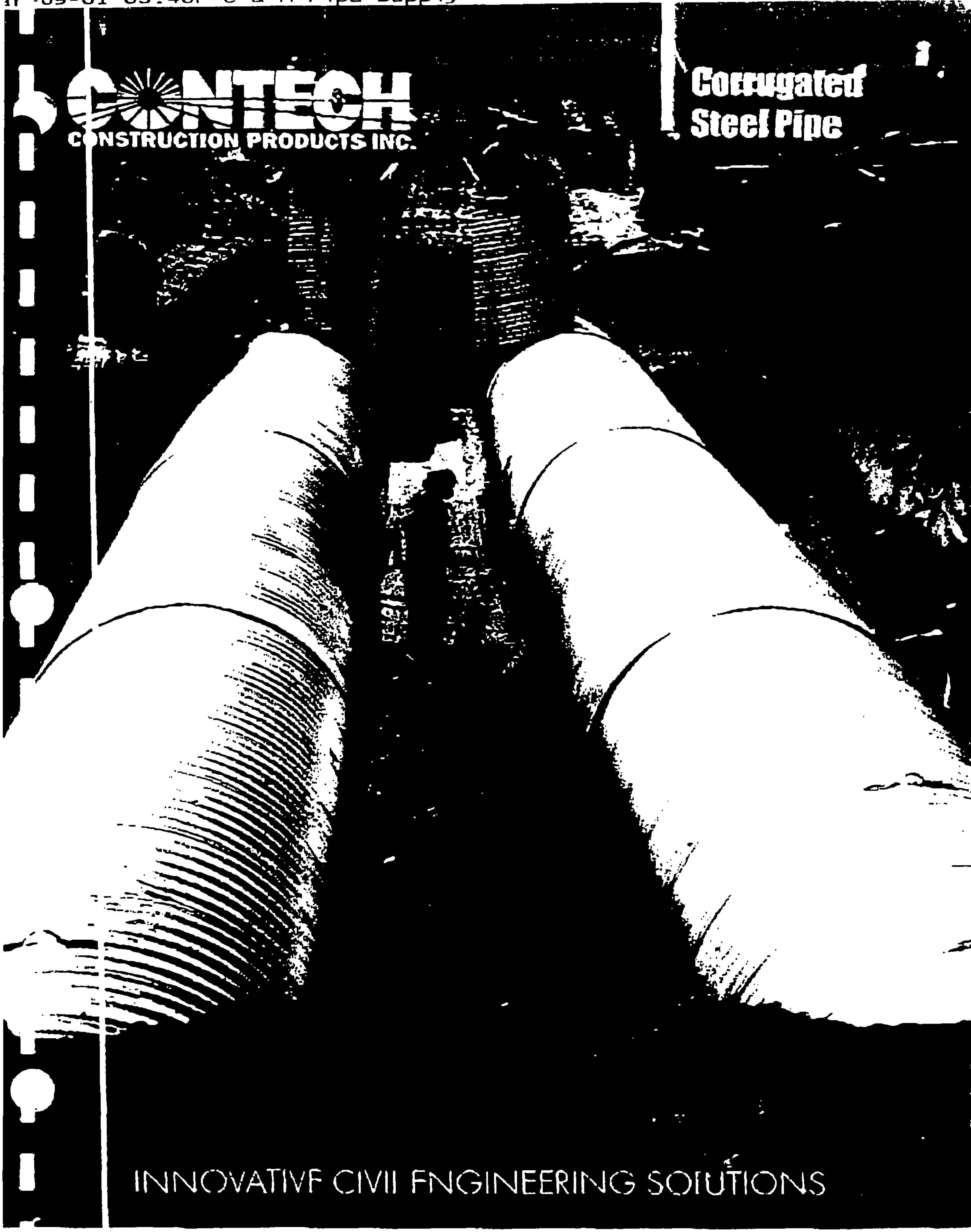
Meter suppliers must have been manufacturing meters for at least ten years.

SYSTEMS GUARANTEE

All meters shall be guaranteed adaptable to the Neptune ARB Encoder, Central Meter Reading (CMR), Tricon, Neptune Manual Reader (NMR), and the Unigun Electronic Meter Reading Systems.

MANUFACTURER'S PRODUCT SPECIFICATIONS

Galvanized Steel Pipe


CONTECH
CONSTRUCTION PRODUCTS INC.
Corrugated
Steel Pipe
INNOVATIVE CIVIL ENGINEERING SOLUTIONS

Reference Specifications

Ma rial	Galvanized Steel	ASTM A 929 and AASHTO M218
	ALUMINIZED STEEL Type 2	ASTM A 929 and AASHTO M274
	FIBER-BONDED STEEL	ASTM A 885
	Polymer-Coated Steel	ASTM A 742 and AASHTO M246
Pip	Steel (Galvanized and ALUMINIZED STEEL Type 2)	ASTM A 760 and AASHTO M36
	Steel (Polymeric)	ASTM A 762 and AASHTO M245
Co ing/Lining	Asphalt and Concrete	ASTM A 849 and AASHTO M190
Des gn	Steel	ASTM A 796 and AASHTO Standard Specification for Highway Bridges, Section 12
Inst lation	Steel	ASTM A 798 and AASHTO Standard Specification for Highway Bridges, Section 26

Dia eters and lengths

CO TECH Corrugated Steel Pipe is available in diameters rang ng from 12" to 84" in the 2-2/3" x 1/2" corrugation. Sma er diameters (6", 8" and 10") are available in 1-1/2" x 1/ " corrugation, but only in lock-seam construction.

The " x 1" corrugation is available in diameters of 36" to 144 , the 5" x 1" corrugation is available in diameters from 48" to 144"

Pipe rch sizes range from 17" x 13" through 83" x 57" for 2 2/3" x 1/2" corrugations and up to 142" x 91" for both 3" x 1" and 5" x 1" corrugations. Normally pipe and pipe rch are supplied in 20-foot lengths. Other lengths are avail ible on request.

Mat rials

Pipe nd pipe-arch are fabricated from four materials. Galv nized steel is used for normal applications. TREN CHCOAT (polymer-coated steel), ALUMINIZED STEEL Type 2™ and FIBER-BONDED steel are used for increased dura ility.

TREN CHCOAT

Dow Chemical Company's TRENCHCOAT heavy-gauge prote tive polymer material provides excellent protection from oil-side and water-side corrosion. This tough, polymer coati g can triple the life of galvanized culverts.

Dow's field and laboratory tests (over 23 years) demonstrate that TRENCHCOAT provides excellent corrosion and abrasion resistance for corrugated steel pipe and, depending upon the site environment, can result in life spans up to 100 years.

CONTECH Corrugated Steel Pipe with TRENCHCOAT® heavy-gauge protective film offers long-term protection for storm drains and culverts in adverse conditions.

ALUMINIZED STEEL Type 2

Pipe is fabricated from steel that has been hot-dip coated in commercially pure aluminum. Over 43 years of field testing confirm that ALUMINIZED STEEL Type 2 Corrugated Steel Pipe offers 75 years or more of service life in the environmental ranges of pH 5-9 with resistivities as low as 1,500 ohm-cm.

ALUMINIZED STEEL® Type 2 provides a minimum service life of 75 years or more when installed in the recommended environment.

Heights-of-Cover

1-1 '2" x 1/4" Height-of-Cover Limits for Corrugated Steel Pipe

H 2[illegible], H 25 Load and E 80 Live Loads

Dia[illegible]eter, In[illegible]es	Minimum Cover, Inches	Maximum Cover, Feet, Specified Thickness, Inches: 0.052	0.064
[illegible]	12	388	486
[illegible]	12	291	365
[illegible]	12	233	292

2-2 '3" x 1/2" Height-of-Cover Limits for Corrugated Steel Pipe

H 2[illegible] and H 25 Live Loads

Dia[illegible]eter or S[illegible]an, In[illegible]es	Minimum Cover, Inches	Maximum Cover, Feet, Specified Thickness, Inches: 0.052	0.064	0.079	0.109	0.138	0.168
2	12	198	248	310			
5		158	199	248			
8		132	166	207			
[illegible]1		113	142	178	249		
[illegible]4		99	124	155	218		
[illegible]0		79	99	124	174		
[illegible]5		66	83	103	145	186	
[illegible]2		56	71	88	124	160	195
[illegible]8			62	77	109	140	171
[illegible]4				66	93	122	150
[illegible]0					79	104	128
[illegible]5					68	88	109
[illegible]2						75	93
[illegible]8							79
[illegible]4	12						66

E 8[illegible] Live Loads

Dia[illegible]eter or S[illegible]an, In[illegible]es	Minimum Cover, Inches	Maximum Cover, Feet, Specified Thickness, Inches: 0.052	0.064	0.079	0.109	0.138	0.168
2	12	198	248	310			
5		158	199	248			
8		132	166	207			
[illegible]1		113	142	178	249		
[illegible]4		99	124	155	218		
[illegible]0		79	99	124	174		
[illegible]5		66	83	103	145	186	
[illegible]2		56	71	88	124	160	195
[illegible]8	12		62	77	109	140	171
[illegible]4	18			66	93	122	150
[illegible]0					79	104	128
[illegible]5					68	88	109
[illegible]2	18					75	93
[illegible]8	24						79
[illegible]4	24						66

H 20 and H 25 Live Loads, Pipe-Arch

Size: Round Equivalent, Inches	Span x Rise, Inches	Minimum Structural Thickness, Inches	Minimum Cover, Inches	Maximum Cover, Feet: 2 Tons/Ft.² Corner Bearing Pressure
15	17 x 13	0.064	12	16**
18	21 x 15	0.064		15**
21	24 x 18	0.064		
24	28 x 20	0.064		
30	35 x 24	0.064		
36	42 x 29	0.064		
42	49 x 33	0.064*		
48	57 x 38	0.064*		
54	64 x 43	0.079*		
60	71 x 47	0.109*		
66	77 x 52	0.109*		
72	83 x 57	0.138*	12	15**

E 80 Live Loads, Pipe-Arch

Size: Round Equivalent, Inches	Span x Rise, Inches	Minimum Structural Thickness, Inches	Minimum Cover, Inches	Maximum Cover, Feet: 3 Tons/Ft.² Corner Bearing Pressure
15	17 x 13	0.079	24	22
18	21 x 15	0.079		
21	24 x 18	0.109		
24	28 x 20	0.109		
30	35 x 24	0.138		
36	42 x 29	0.138		
42	49 x 33	0.138*		
48	57 x 38	0.138*		
54	64 x 43	0.138*		
60	71 x 47	0.138*	24	22

* These values are based on the AISI Flexibility Factor limit (0.0433 x 1.5) for pipe-arch. Due to variations in arching equipment, thicker gauges may be required to prevent crimping of the haunches.

**These values were calculated using K=0.86 as adopted in the AISI Handbook, Fifth Edition, 1994.

Heig[illegible]ts-of-cover notes

1. Th[illegible]se tables are for lock-seam or welded-seam construction. They are not fo[illegible] riveted construction. Consult your CONTECH Sales Engineer for he[illegible]ghts-of-cover tables on riveted pipe.
2. Th[illegible] haunch areas of a pipe-arch are the most critical zone for b[illegible]ckfilling. Extra care should be taken to provide good material and [illegible] [illegible] to a point above the spring line.
3. E[illegible]0 minimum cover is measured from top of pipe to bottom of tie.
4. H 20 and H 25 minimum cover is measured from top of pipe to bottom of flexible pavement or top of rigid pavement.
5. Th[illegible] H 20 and H 25 pipe-arch tables are based on 2 tons per square foot co[illegible]ner bearing pressures.
6. The E 80 pipe-arch tables minimum and maximum covers are based on the corner bearing pressures shown. These values may increase or decrease with changes in allowable corner bearing pressures.
7. 0.052" is 18 gauge.
   0.064" is 16 gauge.
   0.079" is 14 gauge.
   0.109" is 12 gauge.
   0.138" is 10 gauge.
   0.168" is 8 gauge.
8. For construction loads, see Page 9.

Approximate Weight/Foot CONTECH Corrugated Steel Pipe

(Estimated Average Weights—Not for Specification Use)

1 1/2" x 1/4" Corrugation

Inside Diameter, in.	Specified Thickness, in.	Galvanized & ALUMINIZED	Full Coated
6	0.052	4	5
	0.064	5	6
8	0.052	5	5
	0.064	6	7
10	0.052	6	7
	0.064	7	8

2 2/3" x 1/2" Corrugation

Inside Diameter, in.	Specified Thickness in.	Galvanized & ALUMINIZED*	Full Coated	Coated & PAVED-INVERT	SMOOTH-FLO	HEL-COR CL
1:	0.052	8	10	13		
	0.064	10	12	15		
	0.079	12	14	17		
1.	0.052	10	13	16	26	
	0.064	12	15	18	28	
	0.079	15	18	21	31	
11	0.052	12	16	19	31	
	0.064	15	19	22	34	
	0.079	18	22	25	37	
2	0.052	14	18	23	36	
	0.064	17	21	26	39	
	0.079	21	25	30	43	
2-	0.052	15	20	26	41	
	0.064	19	24	30	45	65
	0.079	24	29	35	50	69
	0.109	33	38	44	59	77
3(	0.052	20	26	32	51	
	0.064	24	30	36	55	82
	0.079	30	36	42	60	87
	0.109	41	47	53	72	96
3(	0.052	24	31	39	50	
	0.064	29	36	44	65	78
	0.079	36	43	51	75	104
	0.109	49	56	64	90	116
	0.138	62	69	77	100	127
4:	0.052	28	36	45	71	
	0.064	34	42	51	77	114
	0.079	42	50	59	85	121
	0.109	57	65	74	100	135
	0.138	72	80	89	115	149
4E	0.064	38	48	57	85	126
	0.079	48	58	67	95	138
	0.109	65	75	84	112	154
	0.138	82	92	101	129	170
	0.168	100	110	119	147	186
54	0.079	54	65	76	105	156
	0.109	73	84	95	124	173
	0.138	92	103	114	143	191
	0.168	112	123	134	163	209
6C	0.109	81	97	106	140	192
	0.138	103	114	128	162	217
	0.168	124	135	149	183	232
66	0.109	69	101	117	160	211
	0.138	113	125	141	100	233
	0.168	137	149	165	210	255
72	0.138	123	137	154	210	254
	0.168	149	163	180	236	278
78	0.168	161	177	194	260	302
84	0.168	173	190	208	270	325

3" x 1" or 5" x 1" Corrugation

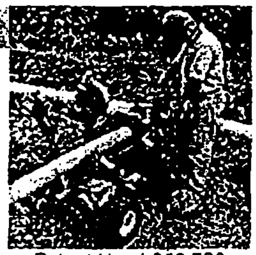
Inside Diameter, In.	Specified Thickness in.	Galvanized & ALUMINIZED*	Full Coated	Coated & PAVED-INVERT	SMOOTH-FLO	HEL-COR CL
54	0.064	50	66	84	138	197
	0.079	61	77	95	149	207
	0.109	83	100	118	171	226
	0.138	106	123	140	194	245
	0.168	129	146	163	217	264
60	0.064	55	73	93	153	218
	0.079	67	86	105	165	229
	0.109	92	110	130	190	251
	0.138	118	136	156	216	272
	0.168	143	161	181	241	293
66	0.064	60	80	102	168	240
	0.079	74	94	116	181	252
	0.109	101	121	143	208	276
	0.138	129	149	171	236	299
	0.168	157	177	199	264	322
72	0.064	66	88	111	183	262
	0.079	81	102	126	197	275
	0.109	110	132	156	227	301
	0.138	140	162	186	257	376
	0.168	171	193	217	288	351
78	0.064	71	95	121	198	
	0.079	87	111	137	214	298
	0.109	119	143	169	246	326
	0.138	152	176	202	279	353
	0.168	185	209	235	312	380
84	0.064	77	102	130	213	
	0.079	94	119	147	230	321
	0.109	128	154	182	264	351
	0.138	164	189	217	300	379
	0.168	199	224	253	335	409
90	0.064	82	109	140	228	
	0.079	100	127	158	246	
	0.109	137	164	195	283	376
	0.138	175	202	233	321	406
	0.168	213	240	271	359	438
96	0.064	87	116	149	242	
	0.079	107	136	169	262	
	0.109	147	176	209	302	401
	0.138	188	217	250	343	433
	0.168	228	257	290	383	467
102	0.064	93	124	158	258	
	0.079	114	145	179	279	
	0.109	155	186	220	320	426
	0.138	198	229	263	363	460
	0.168	241	272	306	406	495
108	0.079	120	153	188	295	
	0.109	165	198	233	340	
	0.138	211	244	279	386	407
	0.168	256	289	324	431	525
114	0.079	127	162	199	312	
	0.109	174	209	246	359	
	0.138	222	257	294	407	514
	0.168	271	306	343	456	554
120	0.109	183	220	259	378	
	0.138	234	271	310	429	541
	0.168	284	321	360	479	583
126	0.138	247	285	326	452	
132	0.138	259	299	342	474	
	0.168	314	354	397	529	
138	0.138	270	312	357	495	
	0.168	328	370	415	553	
144	0.168	344	388	435	579	

*Weights for TRENCHCOAT polymercoated pipe are 1% to 4% higher, varying by gauge.

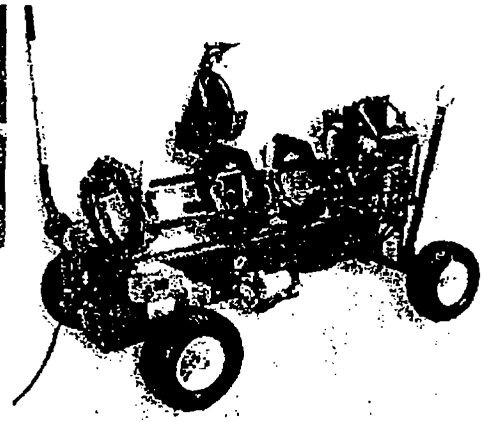
MANUFACTURER'S PRODUCT SPECIFICATIONS

HDPE Fusion Machine

No. 28 & 28CU



Patent No. 4,352,708



The McElroy No. 28 hydraulic fusion machine will butt fuse all pipe sizes from 2" IPS – 8" DIPS (63mm – 225mm). The No.28 also allows for butt fusion of most fittings without special holders or removal of the outer jaw. Mitered inserts are available for fabricating ells in the shop or in the field. The carriage can be easily removed from the chassis for in–ditch use.

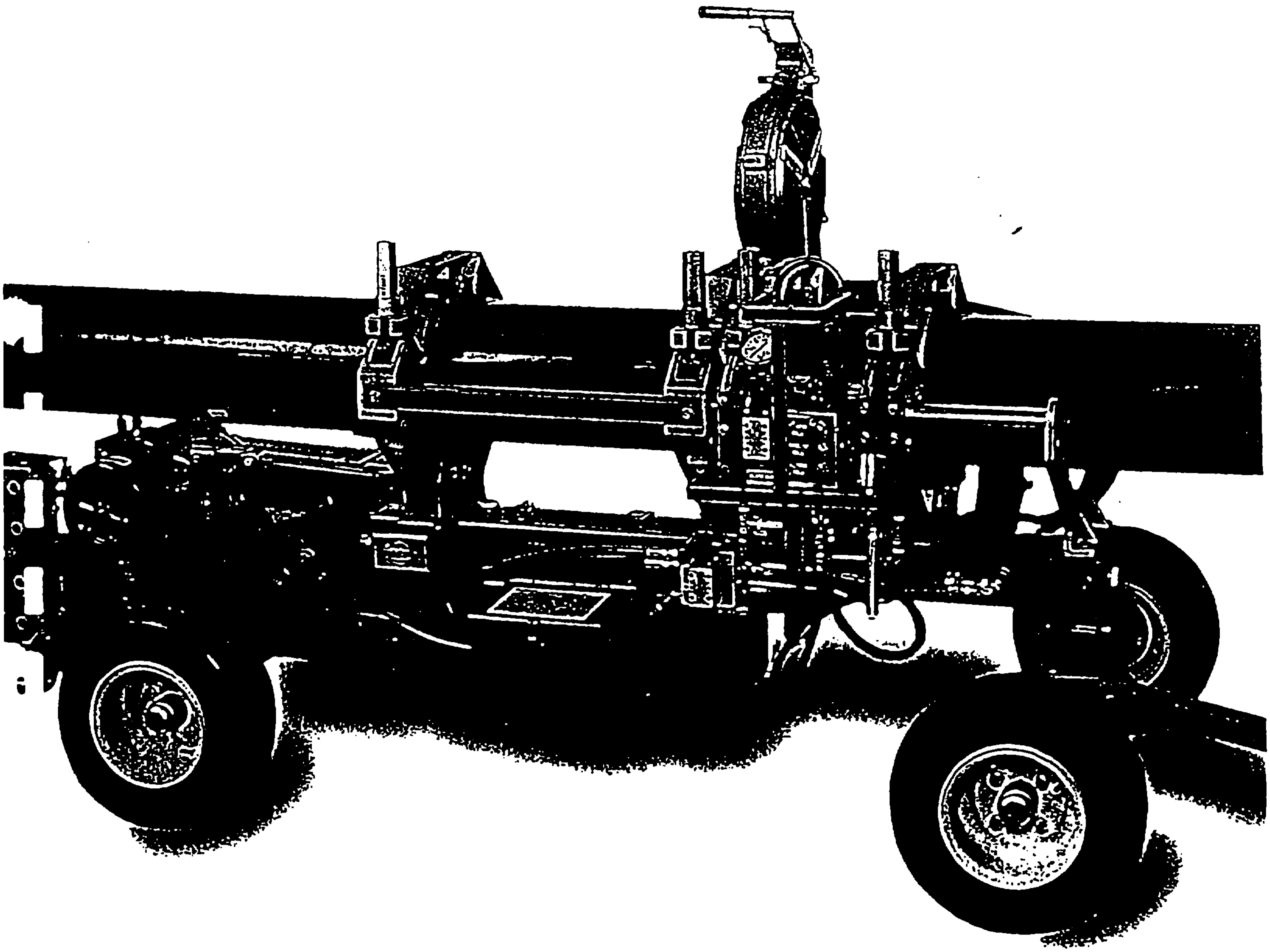
The No.28CU (Combination Unit) adds saddle fusion capability of up to an 8" (200 mm) branch on any size main. The No.28CU allows for butt fusion of most fittings without special holders or removal of the outer jaw.

Both units incorporate McElroy's patented Centerline Guidance System and are DataLogger compatible.

get it! manual drawings more info buy one

McElroy Manufacturing, Inc.

McElroy No. 412 Hydraulic Fusion Machine.



Specifications Subject To Change
Bulletin No. 0505945M
Printed in U.S.A.

MEMBER PPI, DCA, AWWA, AGA, WEF.

Join Forces Easily.
The self-contained No. 412 Hydraulic Fusion Machine's semi-automatic hydraulic control system is energy efficient and requires no auxiliary power to perform butt fusion easily. It is also available in an electric model No. 412E.

The top works removes easily for in-ditch fusion using optional hydraulic extension hoses with quick disconnects. The thrust bearings in clamp knobs reduce the operator's clamping efforts. The machine is equipped with a hydraulically powered "V" roller to assist the operator in pipe handling and removal.

Versatility For Your Specific Needs.
The No. 412 handles butt fusion from 4" IPS through 12" IPS pipe and 6" through 12" IPS fittings. Metric sizes are from 110mm to 315mm. Mitered inserts for fabricating ells are also available. Our machine design allows for butt fusion of most fittings without special holders or removal of the outer jaw.

Dependable Efficiency.
Our patented Centerline Guidance System assures joint reliability with minimal machine maintenance. Its simplified hydraulic system with compact manifold block reduces maintenance and time required to train the operator.

The butt fusion heater has replaceable, bolt-on butt fusion heater adapters coated with a durable, antistick coating. Heater temperature is accurately controlled by an externally adjustable thermoswitch.
A dial thermometer allows the operator to monitor heater temperature and its dual handles aid in easy operation.

The maintenance-free ball bearing facer with powerful hydraulic motor faces heavy wall pipe with ease. Facer stops ensure square fusion surfaces every time. The facer pivots on a shaft mounted in ball bushings for ease of movement and it automatically locks open or closed.

The No. 412 Hydraulic Fusion Machine. Another reason why McElroy Manufacturing is *The leader by design*.

Unit Dimensions –

Width:	46" (116.8cm)
Length:	82" (208.3cm)
Height:	46" (116.8cm)
Weight:	1,170 lbs. (530.7k) (412E - 915 lbs. or 415k)
Top Works:	260 lbs. (117.9k)
Facer:	110 lbs. (49.9k)
Heater:	39 lbs. (17.7k), 3000 W, 240 V, 10 AC only, 60 Hz. (50 Hz.)

Electric Model 412E Minimum Power Requirement:
5.5 kw/6.5 kva,
3 Phase, 240 V, 60 Hz. (50 Hz.)

McElroy Manufacturing, Inc.
The leader by design.

P.O. Box 580550
'ulsa, Oklahoma 74158-0550
(918) 836-8611
x 200470 Fax (918) 836-3273

McElroy Manufacturing, Inc.

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Corporate Fax 918/831-9285 • Marketing Fax 918/831-9256

INSTRUCTION MANUAL NO. 412 STANDARD HYDRAULIC FUSION UNIT

IMPORTANT

For Your Own Safety
Read this manual completely
and carefully BEFORE operating
this unit

Warranty/Registration Card enclosed. Please fill out and return within 30 days of purchase.

(Serial Number is on McElroy Nametag, located on the frame opposite the operator)

Safety Alerts

This hazard alert sign ⚠ appears in this manual. When you see this sign, carefully read what it says. YOUR SAFETY IS AT STAKE.

You will see the hazard alert sign with these words: DANGER, WARNING, and CAUTION.

⚠DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

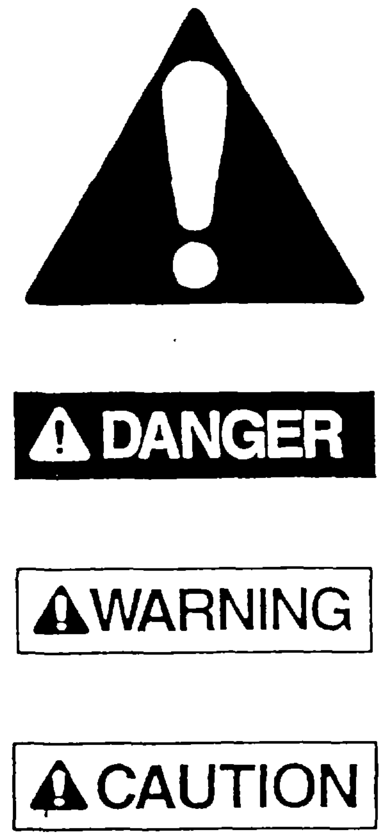
⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

In this manual you should look for two other words: **NOTICE** and **IMPORTANT**.

NOTICE: can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

IMPORTANT: can help you do a better job or make your job easier in some way.



WR00051-11-30-92

TX00030-12-1-92

Read and Understand

Do not operate this equipment until you have carefully read, and understand the "Safety" and "Operation" sections of this manual, and all other equipment manuals that will be used with it.

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

Follow all applicable federal, state, local, and industry specific regulations.

McElroy Manufacturing, Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.

WR00052-12-1-92

TX00031-12-8-92

General Safety

SAFE1ST-12-22-92

Safety is important. Report anything unusual that you notice during set up or operation.

LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

SMELL odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

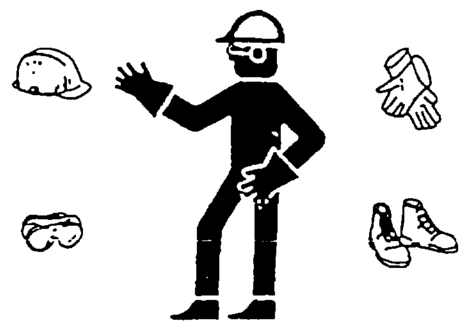
FEEL any changes in the way the equipment operates.

SEE problems with wiring and cables, hydraulic connections, or other equipment.

REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.

TX00114-4-22-93

Wear Safety Equipment



WR00053-12-2-92

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

Remove jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.

TX00032-4-7-93

Units With Hydraulics

WR00078-4-8-93

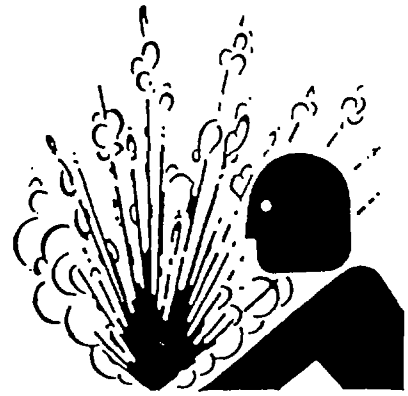
Although the hydraulic pressures in this machine are low compared to some hydraulically operated equipment, it is important to remember that a sudden hydraulic oil leak can cause serious injury, or even be fatal if the pressure is high enough.

⚠WARNING Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.

NOTICE: wear safety glasses, and keep face clear of area when bleeding air from hydraulic system to avoid spraying oil into eyes.

TX00110-8-23-95

Heater Is Not Explosion Proof



WR00034-11-30-92

⚠DANGER This heater is not explosion proof. Operation of heater in a hazardous environment without necessary safety precautions will result in explosion and death.

If operating in a hazardous environment, heater should be brought up to temperature in a safe environment, then unplugged before entering the hazardous atmosphere for fusion.

TX00100-9-16-94

Electric Motors are not Explosion Proof

WR00080-4-12-93

⚠DANGER Electric motors are not explosion proof. Operation of these components in a hazardous environment without necessary safety precautions will result in explosion and death.

When operating in a hazardous environment, remove both brushes from the facer motor and hand crank the unit using the hex drive. Keep pump motor and chassis in a safe area by using hydraulic extension hoses.

TX00106-4-12-93

Electrical Safety

WR00055-4-7-93

⚠WARNING Always ensure power cords are properly grounded. It is important to remember that you are working in a wet environment with electrical devices. Proper ground connections help to minimize the chances of an electric shock.

Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

Do not carry electrical devices by the cord.

WR00025-11-30-92

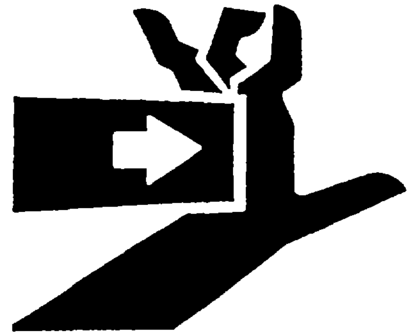
NOTICE: Always connect units to the proper power source as listed on the unit, or in the owner's manual. On units with two power cords, plug each cord into separate power circuits. Do not plug into both outlets of one duplex receptacle.

NOTICE: Disconnect the machine from the power source before attempting any maintenance or adjustment.

TX00105-4-12-93

Crush Points

⚠WARNING Hydraulically operated jaws are operated under pressure. Anything caught in the jaws will be crushed. Keep fingers, feet, arms, legs, and head out of the jaw area. Always check pipe alignment with a pencil or similar object.



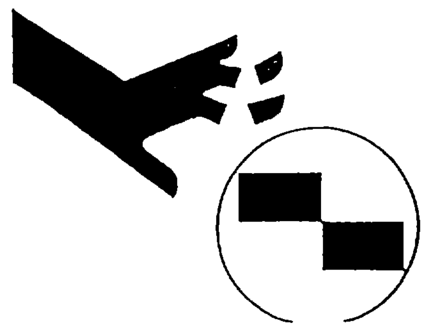
WR00012-12-4-92

x00103-4-6 93

Facer Blades Are Sharp

⚠WARNING Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running, or is in the facing position between the jaws. Use care when operating the facer, and when handling the unit.

NOTICE: Disconnect power from the facer, and remove the facer blades before attempting any maintenance or adjustment.



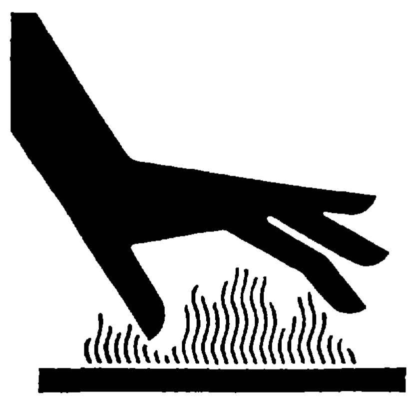
WR00073-4-6-93

102-4-16-93

Heater Is Hot

⚠CAUTION The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or blanket when not in use, and use care when heating the pipe.

NOTICE: Use only a clean non-synthetic cloth such as a cotton cloth to clean the heater plates.



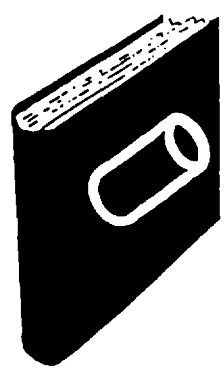
WR00030-2-10-93

TX00104-8-12-94

Fusion Procedures

Obtain a copy of the pipe manufacturer's procedures for the pipe being fused. Follow the procedure carefully, and adhere to all specified parameters.

⚠CAUTION Failure to follow pipe manufacturer's procedure could result in a bad joint. Always follow pipe manufacturer's procedures.



WR00079-4-12-93

TX00113-4-12-93

Units With Gas Engines

⚠WARNING Handle fuel with care. Fuel is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors. Help prevent fires by keeping machine clean of accumulated trash, grease, debris, and facer shavings. Always clean up spilled fuel.

WR00082-4-22-93

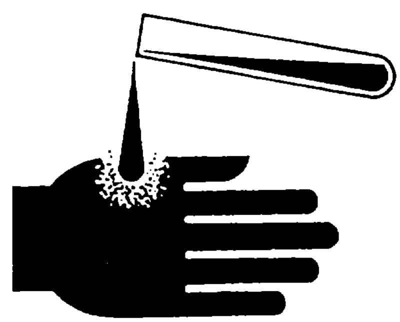
⚠WARNING Danger Breathing exhaust gases can cause sickness or death. Always operate machine outdoors in an area with adequate ventilation.

WR00032-4-6-93

TX00116-4-22-93

Units with Batteries

⚠CAUTION Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes. Avoid contact with eyes, skin, or clothing. Exploding gases from battery could cause blindness or serious injury. Keep sparks, flames, and cigarettes away.

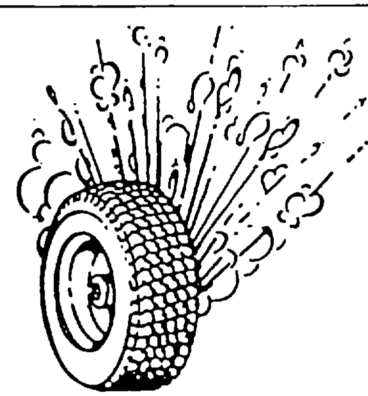


WR00031-4-6-93

TX00117-4-22-93

Have Tires Properly Serviced

⚠WARNING Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death. Have tires mounted by someone that is experienced, and has the proper equipment to perform the job safely.



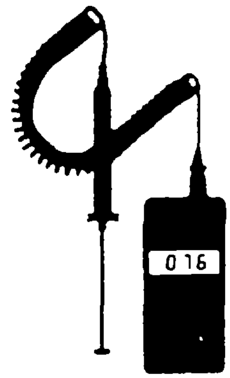
WR00083-4-22-93

TX00118-4-22-93

Periodically Check Temperature

IOTICE: Incorrect heating temperature can result in bad fusion joints. Check heater plate surface 'emperature periodically with a pyrometer, and nake necessary adjustments.

The thermometer on heaters indicates nternal temperature, and should be used s a reference only.

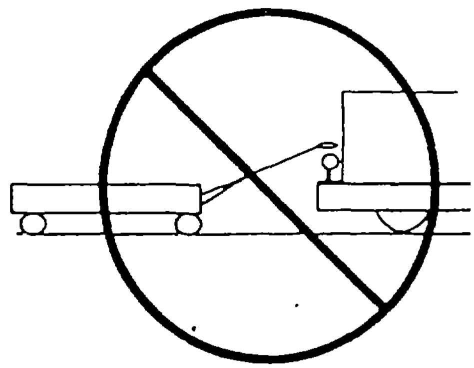


WR00077-4-16-93

X00107-9-15-94

Do Not Tow Fusion Machine At Speeds Greater Than 5 MPH

⚠WARNING The chassis is not designed for over-road towing. Towing at speeds greater than five miles per hour can result in machine damage as well as injury. Always transport the machine by flat bed truck or similar means, and make sure that unit is properly secured.

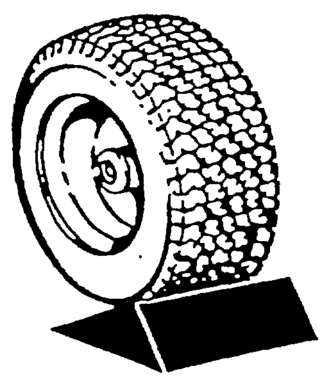


WR00072-4-6-93

0101-4-12-93

Positioning Fusion Machine

Place fusion machine on as level ground as possible, and set the brake on the rear wheel. If it is necessary to operate machine on unlevel grade, chock the wheels and block the unit to make it as stable as possible.



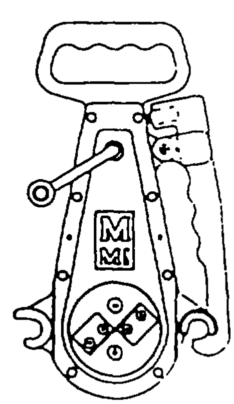
WR00076-4-7-93

TX00112-9-15-94

Transporting 2LC and 2CU Units

On smaller machines it is easiest to carry the unit if the facer is securely installed and locked on the fusion unit. The facer has a handle that allows the unit to be firmly grasped and carried.

NOTICE: Do not carry unit by the lever handles ecause they can release or bend. Care must e used if the unit is grasped elsewhere because numerous pinch points exist.



WR00081-4-22-93

TX00111-4-22-93

McElroy Manufacturing, Inc.
The leader by design.

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Faxline (918) 836-3273

Original: November 22, 1977
Revised: January 11, 1980

SAFETY BULLETIN:

Fusion and Hot Tapping in Explosive Environment

HEATER PLATES AND ELECTRIC MOTOR DRIVEN

FACERS ARE NOT EXPLOSION PROOF!!!

We offer the following suggestions for fusion under hazardous conditions:

Heater plates should be brought up to temperature in a safe environment, then unplugged before entering the ditch or other possibly explosive atmospheres for fusion.

Electric motor-driven facers are equipped with a hex head drive mounted on the motor shaft, which provides for manual operation using a ratchet wrench. Facers produced prior to December 1977 can be so equipped by installing a 1/2-20 NF hex head cap screw and jam nut using loctite into the motor shaft (through the bearing cap opposite the motor).

REMOVE BOTH BRUSHES FROM MOTOR PRIOR TO CRANKING!

It is absolutely mandatory that anyone involved with hot tapping be thoroughly familiar with the written procedures. We further suggest that an actual hot tap be performed on a test main charged with shop air at 60-80 PSI.

Early production tapping tools were equipped with cutters (throat depth 1-3/16"), designed for maximum pipe sizes of 6" SDR-9.33. Later production cutters (throat depth 1-9/16"), must be used if hot tapping 8" SDR-11 or heavier. Be sure to measure cutter depth before hot tapping 8" SDR-11 or heavier.

We hope this information will assist you in the safe operation of McElroy fusion equipment. Please call on us any time we can be of service.

Very truly yours,

McELROY MANUFACTURING, INC.

D. G. (Dave) Dutton
Vice President, Marketing & Sales

DGD/vjn

McElroy Manufacturing, Inc.
The leader by design.
P O Box 580550 • Tulsa, Ok 74158-0550 • 918/836-8611 • Telex 200470
Faxline (918) 836-3273

May 15, 1981

ENGINEERING LETTER #13

Ref: Our Engineering Letter #7
Dated August 9, 1977

Subject: Installation of 4" or 6"
Fittings with 12" Fusion Unit

TO ALL 12" FUSION UNIT CUSTOMERS:

Please add the following information to your McElroy 12" Fusion Unit Instructions:

INSTALLATION OF 4" OR 6" FITTINGS

When installing 4" or 6" fittings with the Old Style McElroy 12" Unit, fittings must have 5" long (or longer), nipples fused to each outlet. Fittings may be ordered with nipples, or they may be installed in the field. If installed in the field, it must be done with a 4", 6", or 8" Fusion Unit.

The new No. 412 Unit, manufactured after May 15, 1981, with the upper inner fixed jaw relieved on both sides, can fuse 6" molded fittings without adding a nipple. Just add a matching relieved 6" insert half to the upper inner fixed jaw, and fuse 6" molded fittings by positioning the fitting branch up.

Sincerely,

McELROY MANUFACTURING, INC.

Don Best
Vice President, Engineering

DB/vjn

McELROY NO. 412 HYDRAULIC FUSION UNIT
OPERATING INSTRUCTIONS

GENERAL DESCRIPTION OF UNIT

The McElroy No. 412 Fusion Unit is a self-contained unit designed to butt fuse polyolefin pipe from 4" IPS (4.50 OD) minimum to 12" IPS (12.75 OD) maximum. Weight: 1060 pounds. Overall dimensions are 46" wide x 46" high x 82" long. With reasonable maintenance and care, this machine will give years of satisfactory service. Although all parts are designed for and protected against the elements, inside storage is preferable. The McElroy shipping and storage container also provides an inventory control of auxiliary parts.

DESCRIPTION OF COMPONENTS

Carriage Assembly

While on the chassis, the carriage assembly consists of two fixed jaws and two hydraulically operated movable jaws bolted to the frame.

The two hydraulic jaws and the inner fixed jaw are attached together, and can be unbolted from the wagon frame and removed for remote operation. For this we offer optional hydraulic extension hoses. For hazardous environments, the carriage assembly must be removed from the chassis. There must be sufficient hose and cable length for the cart to remain in a safe area.

Chassis

This compact and self-contained fusion system is mounted on a four-wheel chassis for mobility and movement along a pipe line. The front axle has an automotive spindle-type steering, controlled by the tongue. The tongue has a ring on the end to slip over a ball hitch so that the unit may be conveniently maneuvered at the job site. The chassis is not designed for over-road towing.

!!! WARNING !!!

TOWING AT SPEEDS GREATER THAN 5 MPH CAN RESULT IN MACHINE DAMAGE AS WELL AS INJURY. ALWAYS TRANSPORT MACHINE BY FLATBED TRUCK OR SIMILAR MEANS.

Engine

A 16 H.P. Kohler "Cast Iron" electric-start, industrial quality, gasoline engine drives the hydraulic pump for fusion force and power of the facer motor, and a 3.0 KW/220V (1) phase, 60 Hz, alternator to power the heater.

Pump

The Continental pressure compensated pump should be set at 1200 psi.

Oil Reservoir

The reservoir is incorporated in the wagon frame. The oil level should remain visible in the sight gauge in the side of the filler spout. **Never allow dirt or other foreign matter to enter the open tank.** Use Sunmark 2105 or equivalent. Refer to Hydraulic Fluids Recommendations included with this manual.

Filter

This unit is equipped with a 10 Micron Filter on the suction side of the pump. Replace filter and oil approximately every 500 hours of operation.

Hydraulic Manifold Block

Mounted on this block are (1) carriage control valve, (1) selector valve, (3) pressure valves and (1) 1500 psi gauge. The carriage control valve is mounted on top with the gauge. The selector valve, mounted on the front, selects a reduced pressure from one of the pressure reducing valves. Each pressure reducing valve is labeled with a different function; top for facing pressure, middle for heating pressure, and bottom for fusion pressure.

Lift Roller Control

The control valve is located under the inner fixed jaw. Pull to lift and push to lower the pipe lift cylinder.

Hydraulic Cylinders

The two carriage cylinders and the lift cylinder have air bleed screws that must be bled if the system ever runs low on oil or leaks air on suction side of pump. The bleeding procedure for this unit is listed below:

1. Tilt unit so the fixed jaw end is higher than the opposite end.

2. Shift the directional control and move the carriage to the fixed jaw end. Adjust the pressure to approximately 50-100 psi before proceeding to step 3.

3. Loosen the bleed plug on one cylinder next to the fixed jaw.

4. Hold pressure on the cylinder until no air is indicated and quickly retighten the plug.

5. Repeat this operation on the opposite cylinder.

6. Tilt the unit so the opposite end is higher than the fixed jaw end. Move the carriage to the end opposite the fixed jaw and repeat the above procedure on that end of the cylinders.

The lift cylinder also has adjustable cushions on each end of stroke to reduce the shock at end of stroke.

Facer

The facer is of the McElroy rotating planer-block design and each face contains (3) cutter blades. The block rotates on roller bearings and is chain driven (enclosed in lubricant) by a hydraulic motor.

The facer weighs approximately 110 pounds and is pivoted on a shaft attached to the two movable jaws. It is supported and guided by cylinder rods, and will face all sizes of pipe from 4" IPS to 12" IPS. It has a release mechanism on the pivot side for quick and easy removal from the unit and is provided with a lifting ring for handling with hoist (by others) for remote operation.

!!! WARNING !!!

DO NOT LIFT THE FUSION UNIT WITH THIS LIFTING EYE. THE RING IS NOT DESIGNED TO LIFT ENTIRE TOPWORKS. ATTEMPTING TO DO SO CAN RESULT IN SEVERE MACHINE DAMAGE AS WELL AS INJURY.

Alternator

Onan 3.0 YCB-3S/220V, 1 phase, 60 Hz belt driven generator, refer to enclosed manufacturer's manual.

!!! CAUTION !!!

THIS ALTERNATOR IS DESIGNED TO SUPPLY POWER TO THE HEATER ONLY. PLUGGING ANY LIGHTS OR APPLIANCES INTO ALTERNATOR WILL CAUSE THE CIRCUIT TO BE OVERLOADED, AND THE CIRCUIT BREAKER WILL TRIP.

Heater

!!! DANGER !!!

THE HEATER IS NOT EXPLOSION PROOF! FOR OPERATION IN HAZARDOUS ENVIRONMENTS, DISCONNECT THE HEATER FROM THE POWER SOURCE BEFORE ENTERING THE DANGEROUS AREA. FAILURE TO DO SO WILL RESULT IN EXPLOSION AND DEATH.

The heater assembly has cast in place Calrod Units and contains a thermoswitch for temperature control and a dial type thermometer for temperature observation.

The heater is for 4" - 12" IPS pipe (3000 watts, 240V) and weighs approximately 40 pounds. It has two handles for ease of positioning. The heater should always be stored in the insulated heater stand or blanket for protection of the operator, and to minimize heat loss and risk of mechanical damage.

To adjust heater temperature:

!!! WARNING !!!

INCORRECT ADJUSTMENT CAN RESULT IN INJURY AS WELL AS MACHINE DAMAGE. FOLLOW THESE INSTRUCTIONS CAREFULLY.

---

1. Disconnect electric plug to avoid electric shock.

2. The heater thermoswitch adjustment shaft protrudes through the heater handle base. Turn the adjustment shaft clockwise to lower temperature, counter-clockwise to raise temperature. One revolution equals about 100° F. Reconnect electric plug and allow heater to stabilize at new temperature (5 to 10 minutes) after each adjustment.

!!! CAUTION !!!

INCORRECT HEATING TEMPERATURE CAN RESULT IN BAD FUSION JOINTS. CHECK HEATER PLATE PERIODICALLY WITH A PYROMETER FOR SURFACE TEMPERATURE, AND MAKE NECESSARY ADJUSTMENTS.

OPERATION

!!! WARNING !!!

KEEP CLEAR OF JAW AREA. UNIT OPERATES UNDER PRESSURE AND CAN CRUSH HANDS, ARMS, OR OTHER BODY PARTS. BE AWARE OF YOURSELF AND OTHERS WHEN OPERATING THIS MACHINE.

Before starting unit, the following checkout and lubrication should be performed to insure trouble-free operation and optimum life of the unit.

Engine Oil Level Dip Stick - *Do not screw in for proper reading. (Refer to engine manual* for further instructions.)

Hydraulic Fluid Level - Check for oil in sight gauge on filler spout and add if necessary. Use Sunmark 2105 or equivalent oil.

Fuel - Fill the tank with unleaded gasoline in a nonhazardous area.

!!! DANGER !!!

SPARKS CAN IGNITE GASOLINE CAUSING EXPLOSION AND DEATH. DO NOT SMOKE OR OPERATE MACHINERY NEAR UNIT WHEN FILLING WITH GAS.

Grease all zerk fittings with one shot each week.

Disconnect heater plug and open facer operating valve before starting engine.

!!! DANGER !!!

DO NOT OPERATE ENGINE IN A HAZARDOUS ENVIRONMENT. THE ENGINE SHOULD ALWAYS REMAIN IN A SAFE LOCATION. REMOVE TOPWORKS AND ATTACH HOSE EXTENSIONS IF HAZARDOUS OPERATION IS NECESSARY.

To start engine, close choke (move lever away from engine), turn switch to on, and press starter button. Open choke as engine warms up. Engine speed is governor controlled and has been factory set to obtain 255 no load volts, or 230 full load volts from the alternator. DO NOT EXCEED 255 NO LOAD VOLTS.

Close facer operating valve. Plug in heater in a safe environment. Allow unit to run long enough to bring heater to temperature before attempting to fuse pipe.

Check Hydraulic Pressure

The pressure gauge indicates the pressure at the carriage control valve. How much pressure depends on the position of the selector valve and the pressure set on the (3) pressure reducing valves. With the selector valve up, the facing pressure can be set (80 - 100 psi). Shift the selector valve to center and the heating pressure can be set. If heating pressure is not required, set the pressure reducing valve at its lowest setting. With the selector valve down, the fusion pressure can be set. The heating and fusion pressures can be calculated using the enclosed nomogram.

The hydraulic pump is set at 1200 psi from the plant. If additional pressure is required, shift the selector valve to the down (fusion) position and screw the bottom pressure reducing valve "in" as far as it will go. The actual pump pressure should be shown on the pressure gauge at the manifold block.

With the pump running and the system deadheading with no motion occurring, loosen the locknut on the pressure adjusting screw (see pump specification sheet for location) and turn it clockwise to increase the pressure. Watch the pressure gauge on the manifold block and retighten the locknut on the adjusting screw when the desired pressure is reached. Then back off the lower pressure reducing valve to the required fusion pressure.

Pipe Supports

1. For fixed fusion installation, install pipe support stands about 20' in front and behind the unit, and adjust to proper height.

2. When moving the unit from joint to joint, an optional pipe support trailer is available. It is pulled behind the unit, and incorporates a jack to obtain the proper height.

   A. Open upper jaws and insert pipe in each pair of jaws with applicable inserts installed. Let end of pipe protrude about 1-1/2" to 2" past face of jaw. Lower facer into place. With the carriage control valve lever, move the carriage toward the fixed clamps, while watching the gap at each end of the facer rest buttons. When the pipe is in contact with the facer, this gap indicates the amount of material that will be trimmed from the pipe end. Now tighten the clamp knobs on the outside clamps. Snug down the inside clamp knobs.

   B. Turn facer on by opening facer operating valve on top 90°. Assure selector valve handle is in up position. Move the control valve lever all the way toward the facer. Allow facer to cut until the rest buttons are against the stops on either side of the facer.

   C. Turn off the facer motor.

   D. Move carriage to the right.

   E. Swing facer to storage position.

   F. Move carriage to the left until ends of pipe butt together.

   G. Check pipe joint for proper alignment. The pipe ends should be flush with each other. To check for misalignment (hi/lo), use a pencil or similar object between the jaws to look for ridges. If any exist, tighten the high side to align.

!!! WARNING !!!

DO NOT USE FINGERS TO CHECK FOR HI/LO. THE UNIT IS UNDER PRESSURE AND SLIPPAGE COULD RESULT IN CRUSHED FINGERS. <u>ALWAYS</u> STAY CLEAR OF THE JAW AREA.

If pipe is lined up, proceed with Step H. If pipe is not lined up, tighten high side clamp to bring into alignment.

   H. Move carriage to the right.

   I. Check heater temperature. **HEATER PLATE SHOULD BE CHECKED PERIODICALLY WITH A PYROMETER FOR CORRECT <u>SURFACE</u> TEMPERATURE.**

J. Move selector valve handle to bottom position.

K. Insert heater on rods between pipe ends.

!!! DANGER !!!

THE HEATER IS NOT EXPLOSION PROOF! FOR OPERATION IN HAZARDOUS ENVIRONMENTS, DISCONNECT THE HEATER FROM THE POWER SOURCE BEFORE ENTERING THE DANGEROUS AREA. FAILURE TO DO SO WILL RESULT IN EXPLOSION AND DEATH.

L. Move the carriage to the left, bringing the heater into contact with both pipe ends. Move selector valve to center position. If heating pressure is not required, quickly return carriage control valve to neutral position.

M. After following the pipe manufacturer's suggested heating procedure, shift carriage control valve to neutral position and then the selector valve down to fusion position. Move the carriage to the right just enough to remove the heater. After removing heater, quickly move the carriage to the left, bringing the pipe ends together under the pipe manufacturer's recommended pressure. Allow joint to cool under pressure according to pipe manufacturer's recommendations.

N. If operating in a hazardous area, plug the heater into the power source between joints to maintain operating temperature.

!!! CAUTION !!!

FAILURE TO FOLLOW PIPE MANUFACTURER'S HEATING, PRESSURE, AND COOLING RECOMMENDATIONS CAN RESULT IN BAD JOINTS.

O. Shift the carriage control valve to the neutral position. Loosen clamp knobs on movable jaws and move carriage to the right enough to open the jaw to the left of the facer.

P. Loosen clamp knobs on fixed jaws and open jaws.

Q. Raise pipe with hydraulic lift.

R. Move unit to end of pipe or pull pipe to rear through the jaws until the end of the pipe is protruding 1-1/2" - 2" past the jaw face.

S. Insert new joint of pipe in movable jaws and repeat procedure, starting with Step A.

McELROY NO. 28, 412, AND 618 FUSION UNITS

PROCEDURE FOR IN-THE-DITCH FUSION

The following procedure should be used in order to prevent damage to the fusion equipment resulting from improper handling during in-the-ditch fusion.

1. TO REMOVE FACER FROM UNIT

   A. Detach hydraulic hoses from facer at quick disconnect couplings and connect extension hoses on the No. 412 and No. 618 Units. Unplug the facer electric cord on the No. 28 Unit.

   B. Loosen facer locking bolt.

   C. Lift facer by hoist ring and set on cardboard or wood blocks off of the ground.

2. TO REMOVE TOPWORKS FROM CART

   A. Remove tiedown bolts from rod end support plate and inner fixed jaw.

   B. Remove braces from inner fixed jaw.

   C. Detach hydraulic hoses from valve system at quick disconnect couplings and connect extension hoses. The elbow end of the extension hoses should be fastened to the carriage/hydraulic manifold. The straight end should attach to the cart of the units.

   D. Attach lifting sling to hoist ring on top jaw (insure that jaw is clamped tightly), lift unit from cart and set top clamping works on ground.

3. TO LOWER TOPWORKS INTO DITCH

   A. Remove top clamps from unit by pulling ball lock pins.

   B. Attach lifting sling to lifting eye on guard rail.

   C. Lift unit up and lower into ditch.

4. TO CLAMP UNIT TO PIPE

   A. Position unit upside down on pipe.

   B. Attach top clamps to unit and clamp loosely around pipe.

   C. Roll unit around pipe 180° to normal upright position.

5. TO LOWER FACER INTO DITCH

   Attach lifting sling to hoist ring on facer and lower into position and reattach.

6. MAKE FUSION JOINT

   After facing, remove facer from ditch.

7. TO REMOVE UNIT FROM DITCH

   A. Loosen pipe clamps and roll unit 180° around pipe.

      NOTE: Always rotate unit with valve system facing up for protection against damage.

   B. Remove top clamps.

   C. Attach sling to lifting point.

   D. Lift unit from ditch and set upright on the ground. Replace top clamp.

   E. Attach sling to hoist ring on top clamp and set topworks on cart. Bolt unit to cart and replace standard hoses.

   F. Lift facer and place in position on unit. Replace standard hoses.

MANUFACTURER'S PRODUCT SPECIFICATIONS

Extrusion Welder

WEGENER NORTH AMERICA, INC.

231 Frontage Road Unit # 12, Burr Ridge, IL 60521 (708) 789-0880 TELEX 282152 FAX (708) 789-1380

April 10, 1996

QUOTATION FOR EXTRUSION WELDER MODEL WEG 342F

WEG 342F extrusion welder for welding of PE liners, recommended for up to 100 mil thickness.

Features:

- Concealed thermocouple reaches **into the plastic material** at the nozzle to ensure **accurate** temperature measurement of the extrudate. Both actual and set point temperatures can be read off the digital display of the temperature regulator. New "hidden" design of thermocouple protects it from damage.
- State of the art temperature regulator with **microprocessor control** prevents cold starts by inhibiting motor activation until the barrel temperature has reached at least 180° C.
- Very sophisticated, hard chromed extrusion screw (ventilation-compression-mixing zone) and hardened, mirror finished melting chamber design with heater band allows for **optimum** processing of extrudate.
- Patented, **trouble-free** rod feed with internal granulation.
- D-handle design of motor for easier directional control.
- Distance between end of preheat nozzle and base material is fully adjustable.
- Electronically controlled air heater with 2600W capacity.
- Exchangeable PTFE shoes are easily machineable to determine weld size and configuration.
- Optional reusable corrugated PE shipping case.

TECHNICAL DATA:

Mains Supply:	220V Single-Phase
Power Consumption:	3940W MAX
Welding Capacity:	Approx. 2.3 Kg/hr (5 lbs/hr) HDPE
Weight:	9.5 Kg (approx 21 lbs)
Length:	24"
Rod Size:	Accommodates 5mm (3/16") diameter

PRICE:	US$ 7,680.00 —
CASE:	US$ [illegible] 275.00
WARRANTY:	6 months
DELIVERY TERMS:	F.O.B. Burr Ridge, IL
DELIVERY TIME:	Ex stock
PAYMENT TERMS:	Net 30 days (with credit approval)

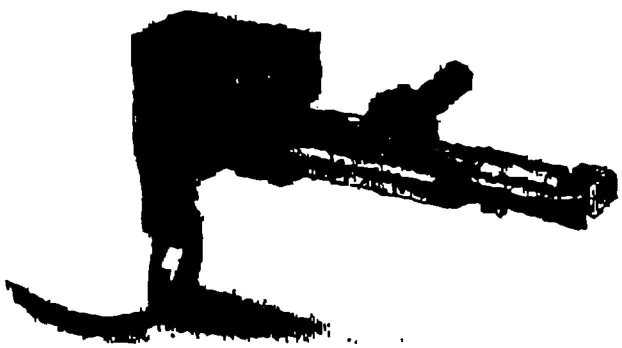
Note: Prices Subject To Change Without Notice

WEGENER

August 30, 2000

QUOTATION FOR EXTRUSION WELDER MODEL EXWELD ALPHA

As a result of extensive research and development in extrusion welding technology, WEGENER introduces the new EXWELD ALPHA.



- ***NEW: Quality assured welding of PVC without repeatedly cleaning or purging the extrusion chamber***
- Suitable for welding PE, PP, PVDF and other thermoplastic materials
- Preheat air and barrel temperatures controlled by a single state-of-the-art temperature regulator
- Quick material changeover
- Unmatched relation between welding capacity, weight and price
- Electronically controlled drive motor with variable welding speed
- Sophisticated extrusion screw and aluminum melting chamber with heater band allows for optimum processing of extrudate
- Patented, trouble-free rod intake system
- Distance between end of preheat nozzle and base material is fully adjustable
- Solid, durable construction
- Easy to operate
- Exchangeable PTFE welding shoes are easily machineable to determine weld size and configuration
- Optional heavy-duty shipping case available

TECHNICAL DATA:

Mains Supply:	230V Single-Phase
Power Consumption:	3320W MAX
Maximum Output:	2.4 Kg/hr (5.3 lbs/hr)
Weight:	6 Kg (approx 13 lbs)
Length:	21"
Rod Size:	PP 3 or 4mm (1/8" or 5/32") PE 3, 4 or 5mm (1/8", 5/32" or 3/16")

PRICE:	*US$ 5,450.00 F.O.B. Burr Ridge, IL*
Multi purpose shipping case:	*US$ 185.00*
WARRANTY:	*12 months*
DELIVERY TIME:	*Ex stock*
PAYMENT TERMS:	*Net 30 days (with credit approval)*

Note: Prices Subject To Change Without Notice

WEGENER North America, Inc.
16W231 S. Frontage Road, Unit #12 • Burr Ridge, IL 60521
PH: (630) 789-0990 Fax: (630) 789-1380 Email: ...

MANUFACTURER'S PRODUCT SPECIFICATIONS

Anti-Seep Bulkhead

SMOOTH HDPE GEOMEMBRANE DATA SHEET

POLYETHYLENE GEOMEMBRANES

Nominal Values

Property	Test Method	20 Mil	30 Mil	40 Mil	*60 Mil	80 Mil	100 Mil
Thickness, mils	ASTM D 1593	20	30	40	60	80	100
Sheet Density, g/cc	ASTM D 1505	0.95	0.95	0.95	0.95	0.95	0.95
Melt Index, g/10 minutes	ASTM D 1238	0.2	0.2	0.2	0.2	0.2	0.2
Carbon Black Content, %	ASTM D 1603	2.5	2.5	2.5	2.5	2.5	2.5
Carbon Black Dispersion	ASTM D 3015	A2	A2	A2	A2	A2	A2
Tensile Properties	ASTM D 638 (Mod. per NSF Std. 54)						
1. Tensile Strength at Yield, ppi		55	82	110	165	220	275
2. Elongation at Yield, %		15	15	15	15	15	15
3. Tensile Strength at Break, ppi		95	142	190	285	380	475
4. Elongation at Break, (2.0" G.L.) %		900	900	900	900	900	900
(2.5" G.L.) %		720	720	720	720	720	720
5. Modulus of Elasticity, psi		110,000	110,000	110,000	110,000	110,000	110,000
Tear Strength, lbs.	ASTM D 1004	17	25	33	50	66	83
Puncture Resistance, lbs.	FTMS 101 - 2065	32	48	64	96	128	160
	ASTM D 4833	42	63	84	126	168	210
Low Temperature Brittleness	ASTM D 746	<-112°F	<-112°F	<-112°F	<-112°F	<-112°F	<-112°F
Environmental Stress Crack Resistance, hours	ASTM D 1693 (Cond. B)	2,000+	2,000+	2,000+	2,000+	2,000+	2,000+
Dimensional Stability, %	ASTM D 1204	+/- 0.5	+/- 0.5	+/- 0.5	+/- 0.5	+/- 0.5	+/- 0.5
Roll Dimensions							
1. Width (feet):		22.5	22.5	22.5	22.5	22.5	22.5
2. Length (feet)		1000	800	600	400	300	250
3. Area (square feet):		22,500	18,000	13,500	9,000	6,750	5,625
4. Weight (pounds, approx.)		2,260	2,710	2,710	2,710	2,710	2,820

Nominal values are average lot property values.
This data is provided for informational purposes only and is not intended as a warranty or guarantee.
Poly-Flex, Inc. assumes no responsibility in connection with the use of this data. These values are subject to change without notice.

MANUFACTURER'S PRODUCT SPECIFICATIONS

Backfill Sand

C. A. P. P.

OURCE OF MATERIAL # 2449 NORTHERN INDIANA MATERIAL

ME OF MATERIAL # Sand #30- B-Borrow

ATE SAMPLED 1/5/01

SAMPLE NUMBER #2

SAMPLE FROM: AREA OF MINING I-96 25N

ME OF SAMPLING 2:00

SAMPLE TAKEN BY Jeff L. CERTIFIED TECH

TYPE OF SAMPLE:

SIDE BY SIDE 2 STOCKPILE 3. START OF PRODUCTION
4. NORMAL PRODUCTION 5. LOAD OUT 6. AUDIT
7 LEDGE 8. INFORMATION 9. RESAMPLE

COMMENTS

	WEIGHT RETAINED	WEIGHT PASSING	PERCENT PASSING	GRADATION SCALE 23/24 #B-BORROW	GRADATION SCALE 30-B-Borrow
SAMPLE SIZE					
½" 12.5MM					100
3/8" 9.5MM		416.9	100	100%	—
#4 4.75MM	5.9	411.0	98.6	95 – 100%	—
#8 2.36MM	8.3	402.7	96.6	80 – 100%	—
#16 1.18MM	19.2	383.5	92.4	50 – 80%	—
#30 600UM	35.7	353.8	84.9	25 – 60%	70-100
50 300UM	226.8	127.0	30.5	7 – 30%	—
#100 150UM	119.1	7.9	1.9	1 – 10%	—
#200 75UM	5.5	2.4	0.6	0 – 3%	0-8.0
PAN	1.0	1.4	0.3		
DECANT	415.7	1.2	0.3		

SAMPLE WEIGHT 4597

Y WEIGHT 745.2 DECANT (DRY) 744.0 TIME STARTED 2:15

PAN WEIGHT 328.3 PAN WEIGHT 328.3 TIME COMPLETED 10:20 1/7/01

ITAL MASS 416.9 FINAL WEIGHT 415.7 PASS/ FAIL Pass

I CERTIFY THE ACCOMPANYING SAMPLE WAS TAKEN BY ME OR I WITNESSED THE SAMPLE BEING TAKEN AND I AGREE IT PROPERLY REPRESENTS THE MATERIAL UNDER CONSIDERATION.

SAMPLED BY: ______ TITLE: ______ (Sample 4589)

LOADER OPERATOR ______

LABORATORY RECORD

TESTED BY: Carol Ordean TITLE: Lab Tech

COMMENTS:

MANUFACTURER'S PRODUCT SPECIFICATIONS

Stone #53

C. A. P. P.

PLANT: NORTHERN INDIANA MATERIAL SOURCE: #2449 MATERIAL: (#2352) 53'S

SAMPLES TAKEN BY: JEFF COURTNEY DATE TAKEN: 11/7/00 TIME TAKEN: 9:45am

TECH: CAROLL CORDEAU

Ledge 5-6 - Sect 3005 F-J PASS SAMPLE # Production

TOTAL MASS g

SIEVE SIZE		LONG GRAD MASS RET		MASS RETAINED	MASS PASSING	PERCENT PASSING	PERCENT REQUIRED
63 mm	2.5"			g	g	%	%
50 mm	2.0"			g	g	%	%
37.5 mm	1.5"			g	7564.5 g	100 %	100 %
25 mm	1.0"			607.0 g	6957.5 g	92.0 %	80 – 100 %
19 mm	.75"			1013.3 g	5944.2 g	78.6 %	70 – 90 %
12.5 mm	.05"			1116.8 g	4827.4 g	63.8 %	55 – 80 %
9.5 mm	.375"	PF		g	g	%	%
4.75 mm	#4			1706.0 g	3121.4 g	41.3 %	35 - 60 %
2.36 mm	#8	168.9		875.2 g	2246.2	29.7 %	25 - 50 %
1.18 mm	#16	142.9		738.4 g	1502.8 g	19.9 %	%
600 um	#30	75.7		392.3 g	1115.5	14.7 %	12 - 30 %
300 um	#50	44.6		231.1 g	884.4	11.7 %	%
150 um	#100	37.2		192.8 g	691.6	9.1 %	%
75 um	#200	36.7		190.2 g	501.4	6.6 %	5 - 10 %
PAN		30.3		157.0 g	344.4	4.6 %	%

DECANT	ORIGINAL	FINAL	GRAMS LOSS	PERCENT LOSS	PERCENT REQUIRED
	7564.5 g	7218.6 g	345.9 g	4.6 %	%

DENSE GRADED MATERIAL	TOTAL MASS PASS 4.75	SAMPLE SIZE	PROPORT. FACTOR
	2772.9 g	535.1 g	5.182

SAMPLE WEIGHT 7898.7

WEIGHT 8856.4 DECANT (DRY) 8510.5 TIME STARTED 9:50

PAN WEIGHT -1291.9 PAN WEIGHT -1291.9 COMPLETED Tuesday

TOTAL WEIGHT 7564.5 FINAL WEIGHT 7218.6 Caroll Cordeau

APPENDIX G

Compaction Testing Records

K & S Engineers, Inc.

9715 Kennedy Avenue, Highland, IN 46322, Phone (219) 924 5231

FIELD COMPACTION TEST

Client	Project	
Koester Environmental 14649 Highway 41 North Evansville, IN 47725 Attn: Mr. Mark Inel	American Chemical Colfax Avenue Griffith, Indiana	FILE NO. 6147 DATE: 2-20-01 REPORT NO. 1 SHEET 1 OF 1

TYPE OF FILL		COMPACTION OF GRADE				METHOD OF COMPACTION	
STONE	X	MOIST		FROZEN		VIBRATING PLATE	X
SAND		DAMP	X	SOFT		VIBRATING ROLLER	
CLAY		WET		LOOSE		SHEEPS FOOT ROLLER	
SLAG		DRY		FIRM	X	RUBBER TIRE ROLLER	

LABORATORY DATA AND PROCEDURES

ASTM D 1557 - 91 ________ METHOD ________

ASTM D 698 - 91 X METHOD A

PROJECT SPECIFICATIONS ________

REFERENCE TEST No.:	1			
MAXIMUM DENSITY PCF	138.5			
OPTIMUM MOISTURE%	8.0			

FIELD TEST METHOD

ASTM D 1556 - 90 ________

ASTM D 3017 - 93 X

OTHER ________

SPECIFICATON REQUIREMENTS

95.0 % MAXIMUM DENSITY

________ % RELATIVE DENSITY

DATE	REF.No.	TEST No.	DRY DENSITY PCF	MOISTURE PERCENT	COMPACTION	PASS OR FAIL	LOCATION OF TEST
2-20	1	1	132.2	5.8	95.5	P	SOUTH SIDE
2-20	1	2	128.6	4.4	92.9	F	CENTER OF THE RAIL TRACK
2-20	1	3	131.7	5.5	95.1	P	NORTH SIDE
2-20	1	4	132.4	5.1	95.6	P	RETEST OF TEST #2

2c: Client

K & S Engineers, Inc.

9715 Kennedy Avenue - Highland IN 46322 (219) 924-5231

REPORT ON

MOISTURE – DENSITY RELATIONSHIP

CLIENT	PROJECT	
Koester Environmental 14649 Highway 41 North Evansville, IN 47725 Attn: Mr. Mark Inel	American Chemical Colfax Avenue Griffith, Indiana	FILE NO. 6147 DATE 2-16-01 REF. NO. 1

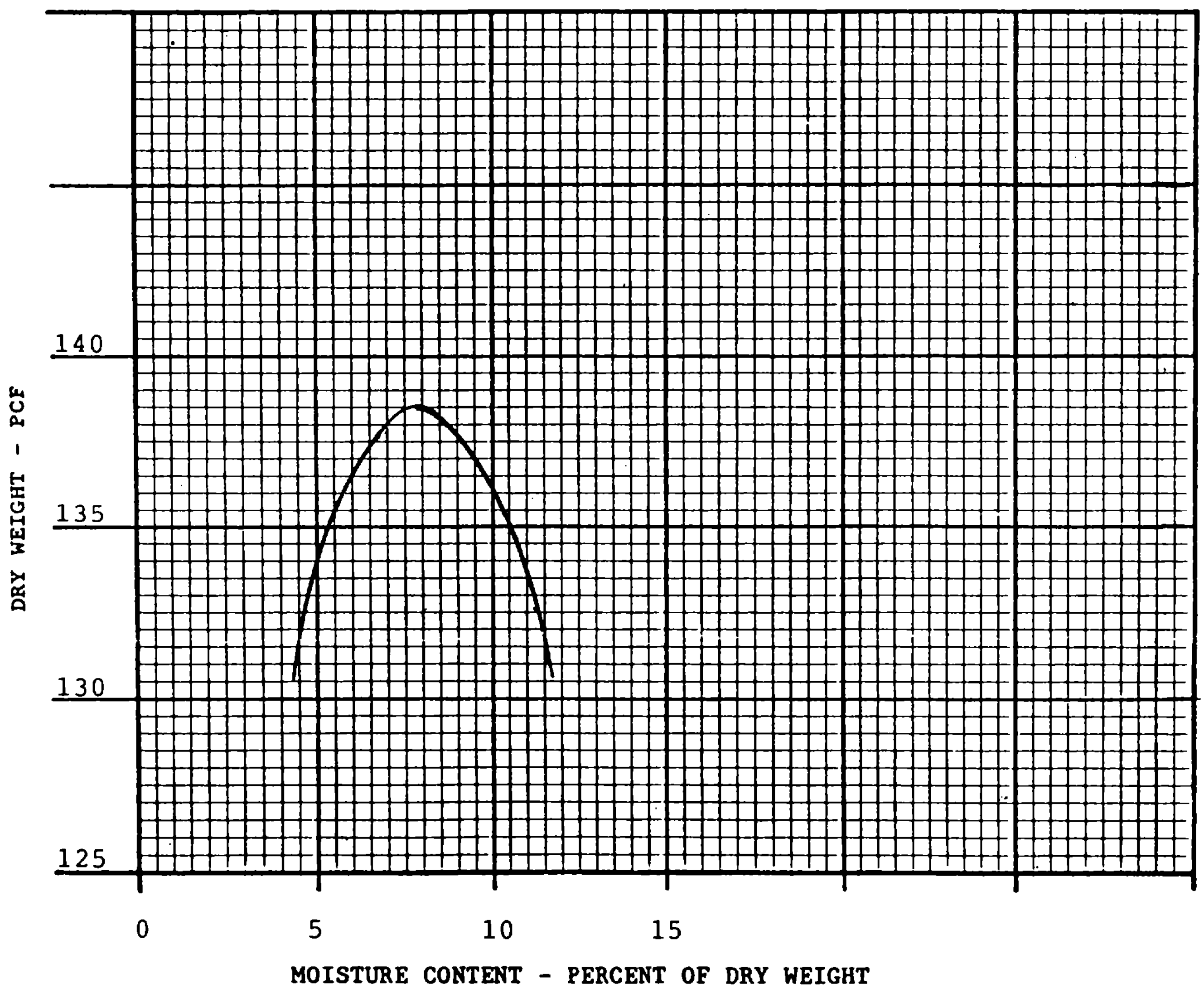
SOURCE OF MATERIAL Borrow

CLASSIFICATION OF MATERIAL IN 53

METHOD OF COMPACTION Standard Proctor ASTM D 698, Method C

HAMMER WEIGHT 5.5 LBS. FALL 12.0 IN NO. OF LAYERS 3

MOLD SIZE 6.0 INCHES MAX. DENSITY 138.5 PCF OPT. MOISTURE 8.0 %



2c: Client

Great Lakes Soil & Environmental Consultants, Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph:(630) 321-0944 Fax:(630) 321-0945

Field Density Test Report (Nuclear Density Test)

Project:	ACS Superfund Site, Griffith, IN
Client	Montgomery Watson Constructors, Inc. 2775 Diehl Road, Suite 300, Warrenville, IL 60555
File No.	2147
Date:	11/8/2001
Tester:	TLB
Specification:	95.0 % of Modified Proctor Density

Test Number	Retest Ref. No.	Location/Description	North Coordinate or Station	East Coordinate or Offset	Elevation (ft)	Soil Description	Probe Depth (Inches)	Wet Density (pcf)	Dry Density (pcf)	Moisture (pcf)	Moisture (%)	Proctor (pcf)	% Compaction	Pass Fail
1		Back Fill - East side			6" Below	Clay	12"	133.0	116.7	16.3	14.0	118.0	98.9	Pass
2		Back Fill - South side			F.G	Clay	12"	128.6	112.3	16.3	14.5	118.0	95.2	Pass
3		Back Fill - West side			F.G	Clay	12"	124.2	107.6	16.6	15.4	118.0	91.2	Fail
4		Back Fill - North side			F.G	Clay	12"	124.6	107.4	17.2	16	118.0	91.0	Fail
5	3	Back Fill - North side			F.G	Clay	12"	132.6	114.0	18.6	16.3	118.0	96.6	Pass
6	4	Back Fill - North side			F.G	Clay	12"	130.6	112.1	18.5	16.5	118.0	95.0	Pass
7		Back Fill - East side			F.G	Clay	12"	130.9	112.4	18.5	16.5	118.0	95.3	Pass
8		Back Fill - West side			F.G	Clay	12"	130.3	112.6	17.7	15.7	118.0	95.4	Pass
9		Back Fill - North side			F.G	Clay	12"	129.3	112.1	17.2	15.3	118.0	95.0	Pass
10		Back Fill - South side			F.G	Clay	12"	130.3	112.3	18.0	16.0	118.0	95.2	Pass

Comments:	Tests taken around M.H 20 C
LFT# = Lift number placed	
F.G = Final Grade	

Great Lakes Soil & Environmental Consultants, Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

CONCRETE CYLINDER COMPRESSIVE STRENGTH TEST REPORT

Project	ACS Superfund Site-Field and Laboratory Testing Services						
Client	Montgomery Watson Harza, Attn: Travis Klingforth						
File No.	2205	**Set No.**	1	**Report Print Date**	10/4/2001	**Qc By**	SB

Specifications

Mix Design #				
Strength Spec.	4000	**psi at**	28	**Days**
Slump Range From		**to**		**Inches**
Air Content Range From		**to**		**%**

Supplier & Sub Information

Concrete Subcontractor	
Concrete Supplier	

Field Test Data

Field Test Date:	9/6/01	**Time Tested:**		**Field Testing By:**	Cont.
Location of Use:					
Truck No.		**Ambient Temperature**	°F		
Ticket No.		**Concrete Temperature**	°F		
Load Size, cu. Yd.		**Final Slump**	In.		
		Final Air Content	%		

Laboratory Test Data

Date Received: 9/8/2001 **No. of Specimens:** 3

Lab Number	15591	15592	15593					
Specimen Area, In²	28.29	28.29	28.29					
Specimen Age	4	14	28					
Test Date	9/10/2001	9/20/2001	10/4/2001					
Tested By	JM	JM	JM					
Actual Strength, psi	3054	3579	4706					
Type of Failure	Shear	Shear	Shear					
Test Result	N/A	Pass	Pass					

Miscellaneous Information

Equipment Serial #	TMI 15098

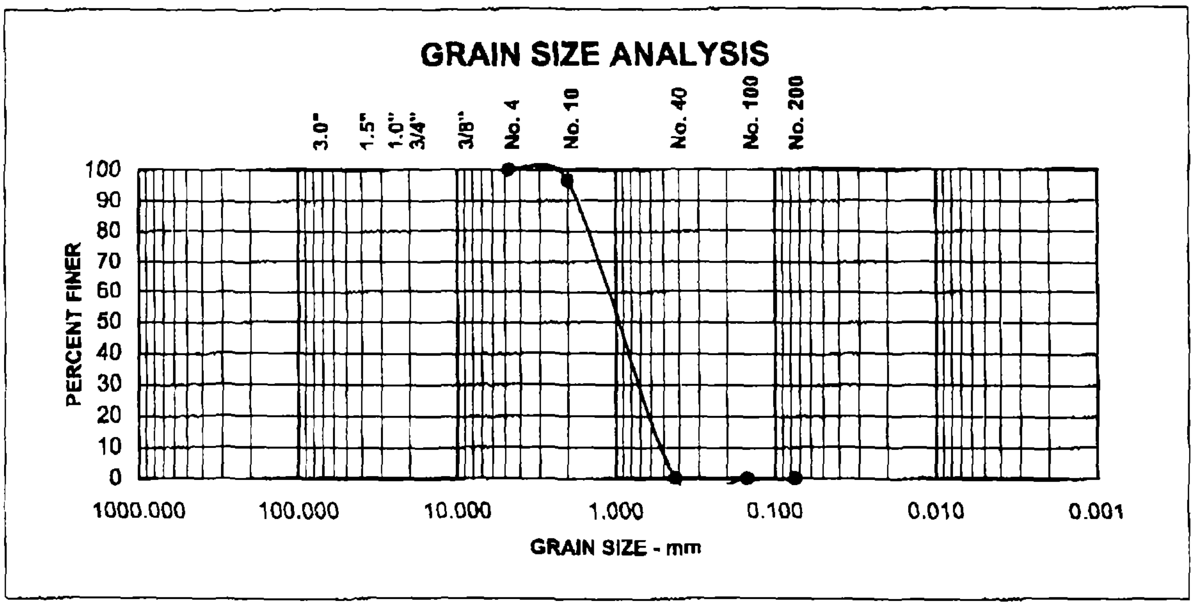
Remarks

Great Lakes Soil & Environmental Consultants, Inc.
333 Shore Drive Burr Ridge, IL 60521 Ph.: (630) 321-0944 Fax: (630) 321-0946

GRAIN SIZE ANALYSIS

Project	ACS Superfund Site, Griffith, IN						
Client	Montgomery Watson Constructors, Inc. 2775 Diehl Road, Suite 300, Warrenville, IL 60555 Attn.: Mr. Tom Tinics						
File No.	2147	Sample #	CARBON FILTER	Date Tested	12/28/2001	Tested by:	AK
						Qc by:	SB

Sample Location:	
Sample Description:	Black Medium to Fine Poorly Graded Carbon Filter Material



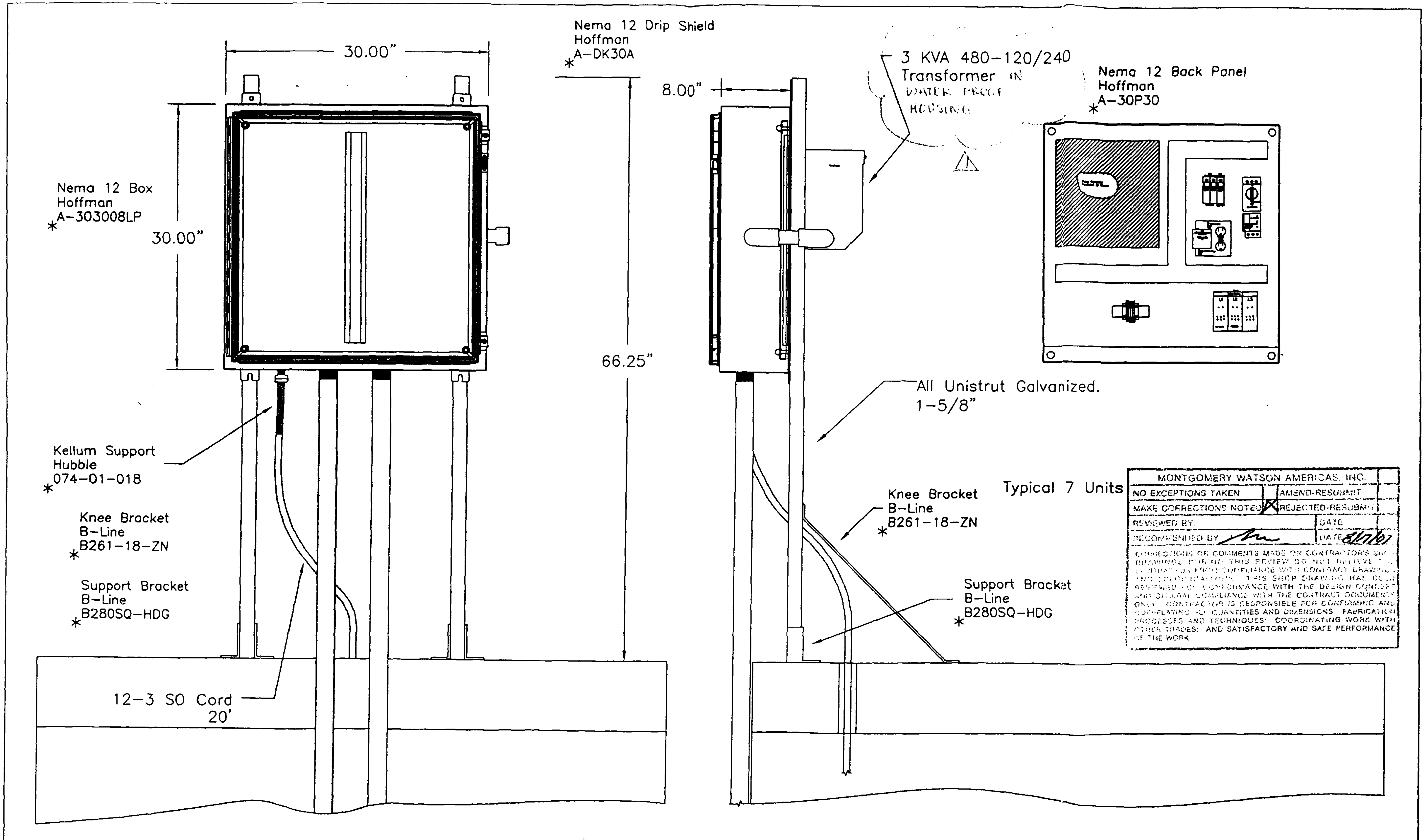
% + 3"	% Gravel Size	% Sand Size	% Fines	
0.0	0.0	99.9	0.1	

Sieve Size	Percent Passing	D85 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	Cc	Cu
		1.8	1.2	0.72	0.52	0.8	2.3
		Soil Classification	SP				
		Soil Description	Black Poorly Graded Material				
#4	100.0	*System*	USCS				
#10	96.7						
#40	0.2						
#100	0.1						
#200	0.1						

Remarks:

APPENDIX H

Electrical As-Built Drawings
(prepared by Austgen Electric)



Austgen Electric Inc.
801 East Main Street
Griffith, IN 46319

DATE	REVISION	BY	CHK'D
8/11/01	ADD WATER PROOF HOUSING FOR TRANSFORMER		

Well Termination Panels

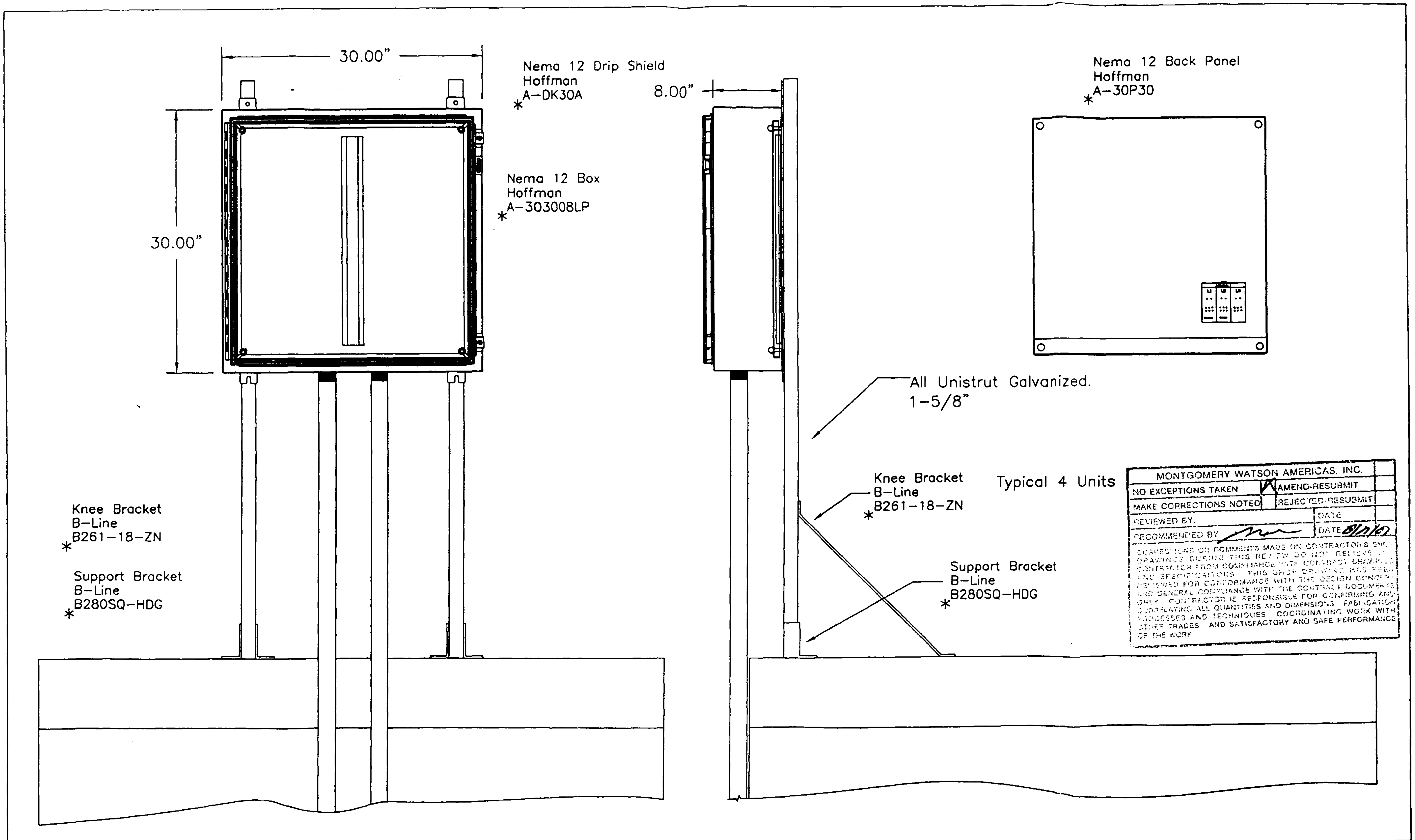
JOB # 10959-01

FILE Mongomery Watson Offsite

CUSTOMER: Montgomery Watson

TITLE: Extraction Wells

SCALE:	DRAWN BY: MA	CHK'D BY:	APP'D BY:
DATE: 8-7-01	SHEET 1 OF SHEETS 4	DRAWING NO. E1	



Austgen Electric Inc.
801 East Main Street
Griffith, IN 46319

DATE	REVISION	BY	CHD

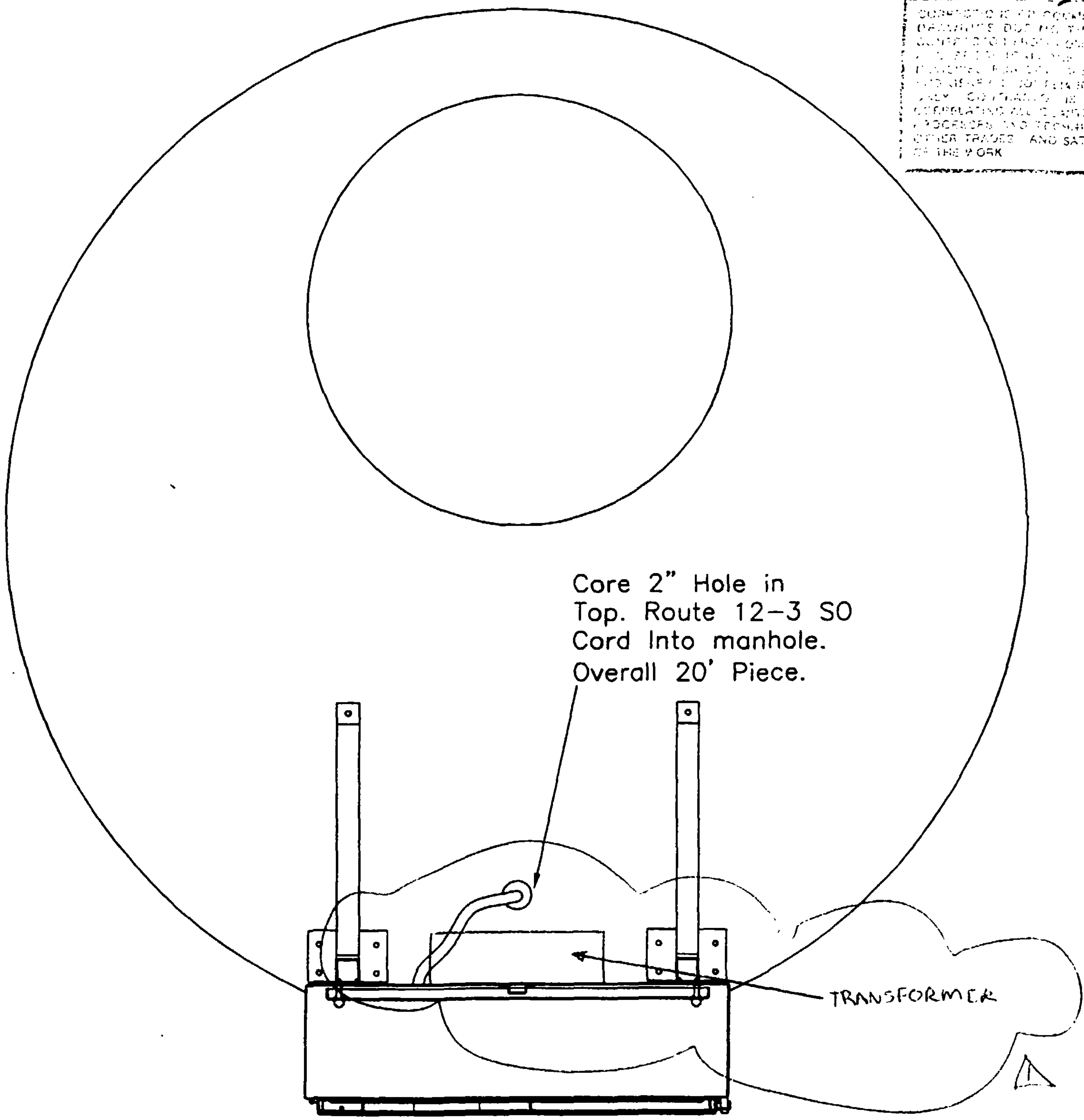
Well Termination Panels

JOB # 10959-01
FILE Mongomery Watson Offsite

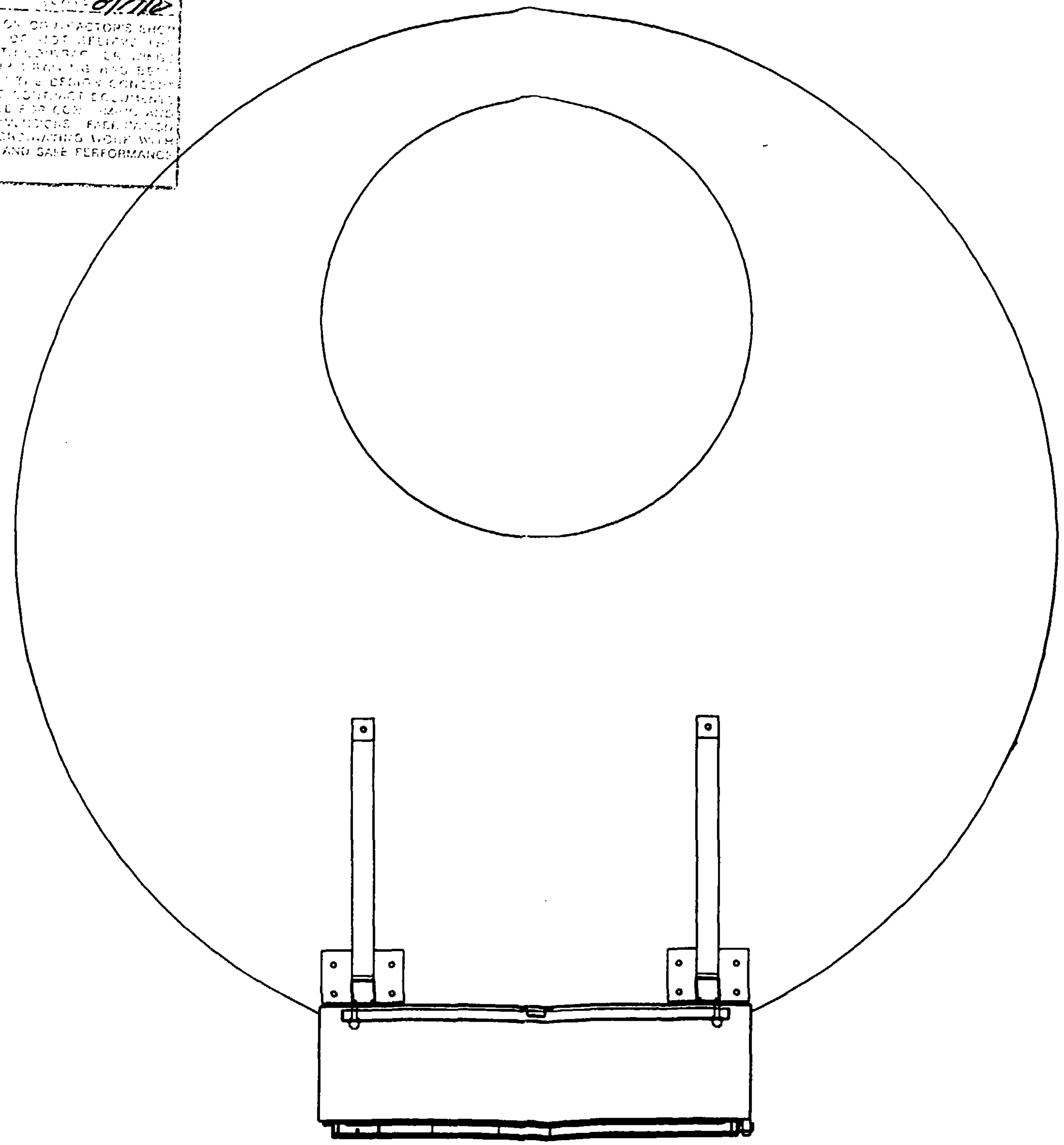
CUSTOMER: Montgomery Watson
TITLE: Extraction Wells

SCALE:	DRAWN BY: MA	CHKD BY:	APP'D BY:
DATE: 8-7-01	SHEET 2 OF SHEETS 4	DRAWING NO. E2	

Typical 7 Units Active



Typical 4 Units Empty



REVIEWED BY

DATE

RECOMMENDED BY

DATE

... OTHER TRADES, AND SATISFACTORY AND SAFE PERFORMANCE OF THE WORK

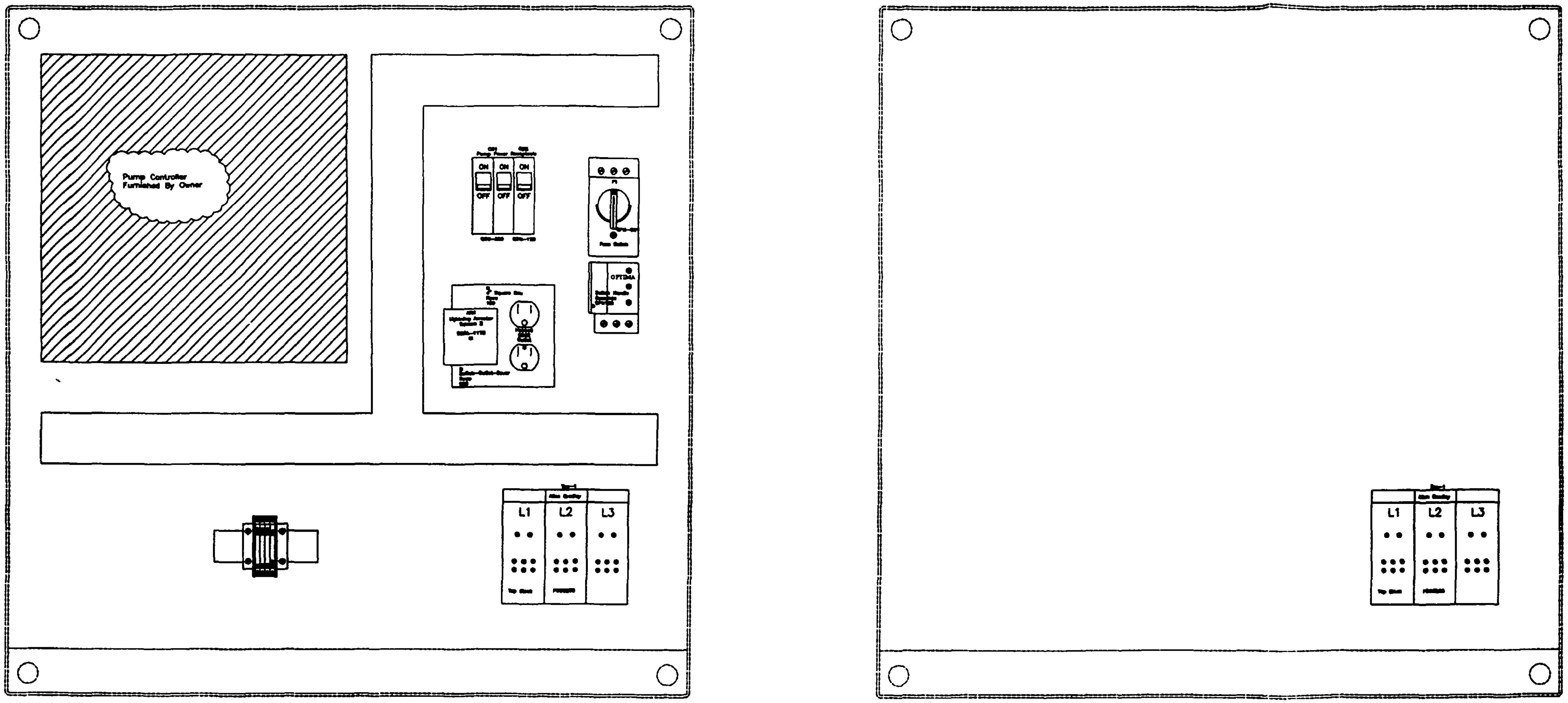
Austgen Electric Inc.
801 East Main Street
Griffith, IN 46319

DATE	REVISION	BY	CH'D
	1 - ADD TRANSFORMERS	RAA	

Well Termination Panels
Top View

JOB # 10959-01
FILE Montgomery Watson Offsite

CUSTOMER: Montgomery Watson
TITLE: Extraction Wells
SCALE: | DRAWN BY: MA | CHKD BY: | APP'D BY:
DATE: 8-7-01 | SHEET OF SHEETS 3 4 | DRAWING NO. E3



MONTGOMERY WATSON AMERICAS, INC.

NO EXCEPTIONS TAKEN	X	AMEND-RESUBMIT	
MAKE CORRECTIONS NOTED		REJECTED-RESUBMIT	
REVIEWED BY		DATE	
RECOMMENDED BY		DATE	8/17/01

CORRECTIONS OR COMMENTS MADE ON CONTRACTOR'S SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS. THIS SHOP DRAWING HAS BEEN REVIEWED FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FABRICATION PROCESSES AND TECHNIQUES, COORDINATING WORK WITH OTHER TRADES, AND SATISFACTORY AND SAFE PERFORMANCE OF THE WORK.

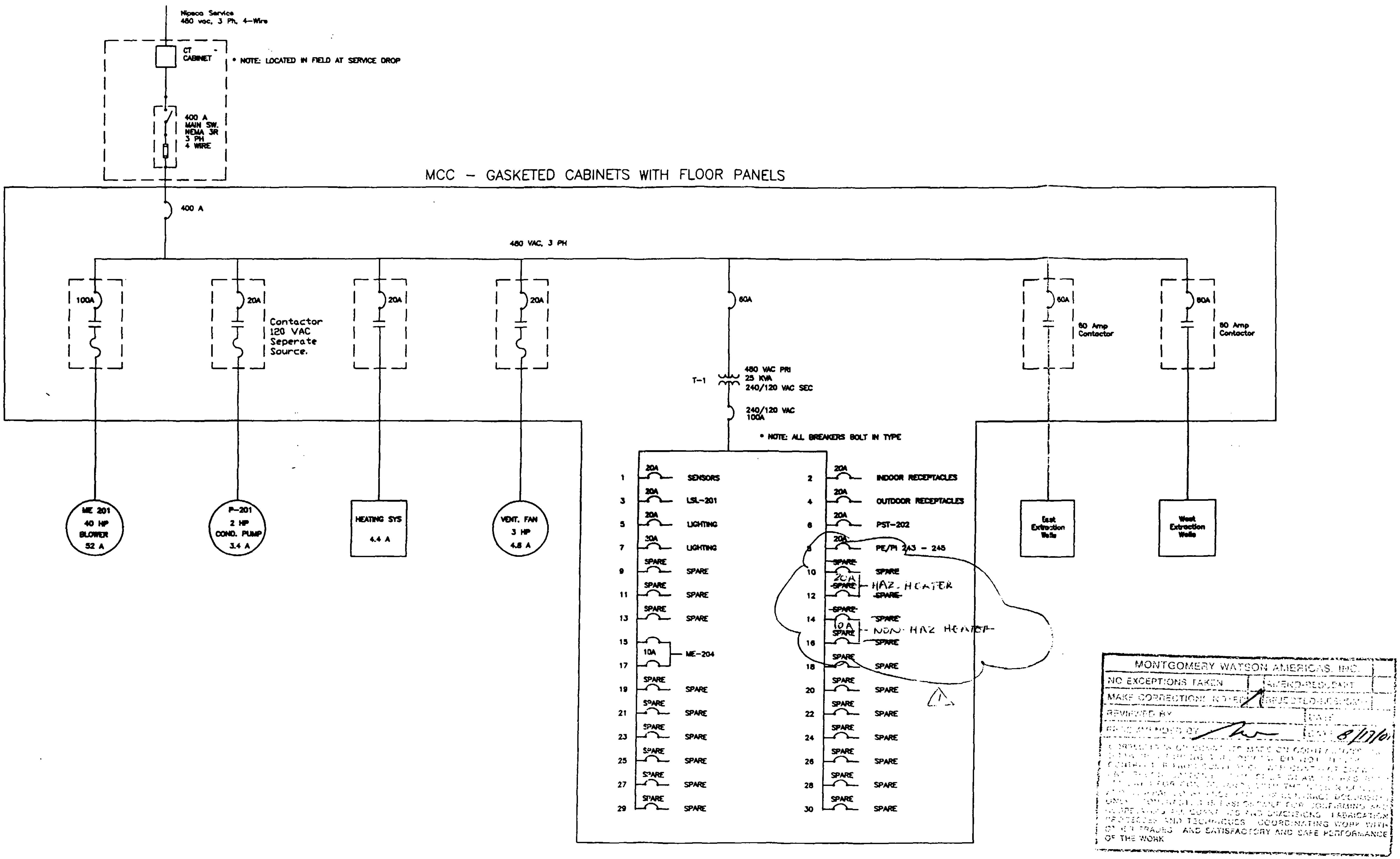
Austgen Electric Inc.
801 East Main Street
Griffith, IN 46319

DATE	REVISION	BY	CH'D

Well Termination Panels
Back Panel Details

JOB # 10959-01
FILE Mongomery Watson Offsite

CUSTOMER: Montgomery Watson			
TITLE: Extraction Wells			
SCALE:	DRAWN BY: MA	CHKD BY:	APP'D BY:
DATE: 8-7-01	SHEET 4 OF SHEETS 4	DRAWING NO. E4	



Austgen Electric Inc.
801 East Main Street
Griffith, IN 46319

DATE	REVISION	BY	CH'D
8-7-01	Modified Well Pump Feeds	ma	
8-7-01	Change hvac to contactor	ma	
8-9-01	Change well feeds to 480	ma	
[illegible]	ADDITIONAL HEATERS	[illegible]	

SINGLE LINE DIAGRAM
POWER SYSTEM

JOB #
FILE MCC1.DWG

CUSTOMER: MONTGOMERY WATSON
TITLE: OFF-SITE UPGRADE
SCALE:
DRAWN BY: RF
CHKD BY:
APP'D BY:
DATE: 8-27-01
SHEET 3 OF SHEETS
DRAWING NO.